REPORT

ON THE

PLAGUE ADMINISTRATION

OF THE

MADRAS PRESIDENCY

BY

J. P. BEDFORD, I.C.S.,
OFFICER ON SPECIAL PLAGUE DUTY.

"Mice that mar the land." (I. Samuel, vi, 5.)

MADRAS:
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Preliminary.

OFFICE OF THE OFFICER ON SPECIAL PLAGUE DUTY,
OOTACAMUND, *dated the 26th September* 1904.

From

J. P. BEDFORD, ESQ., I.C.S.,
Officer on Special Plague Duty,
Ootacamund,

To

THE SECRETARY TO GOVERNMENT,
LOCAL AND MUNICIPAL DEPARTMENT.

SIR,

I HAVE the honour to submit herewith the report called for in G.O., No. 605-P., dated 8th April 1904.

PART I.

INTRODUCTORY—METHOD OF TAKING EVIDENCE.

I am directed to report on the following points :—

(1) Whether the system of circle inspectors has produced results commensurate with the expenditure involved. Points for report.

(2) Whether expenditure can be restricted or reduced with due regard to efficiency.

(3) To what extent the re-infection of infected localities is due to a recrudescence of plague germs all along present in such localities.

(4) Whether increased attention to disinfection is necessary.

(5) Whether the passport-system requires improvement.

(6) What is the relative value of the various known forms of disinfection.

(7) How far an observation staff should be retained during the hot weather.

(8) Whether the arrangements now in force for promoting inoculation require improvement.

(9) What is a proper rate of pay for the subordinate plague staff.

(10) Any other questions, not included in the preceding summary, which bear on plague administration.

2. In accordance with G.O., No. 404, Public, dated the 4th May 1904, I entered on my duties on 26th May 1904. Up to 12th June 1904, I was engaged in getting my office into order, in endeavouring, by reading and discussion, to ascertain how I could best obtain the information called for and in drawing up and communicating to various officers a set of questions embodying, as far as it was possible to do so at that stage, the various points on which information was required. This list of questions, together with a supplementary list circulated from Coimbatore, is printed as Appendix I to this report. Many of the questions are not put in the form in which I should put them now, if I were drawing up such a list, but their general arrangement and grouping are based on my orders of appointment and are not, I think, capable of much improvement.

3. From 12th June 1904 to 4th August 1904, I was engaged in the local enquiry which I have been directed to regard as an important part of my work. My tour is printed as Appendix II. It will be observed that it includes two camps in the Nilgiri District, three in Coimbatore, three in Salem, three in Bellary, three in North Arcot, two in Anantapur and one in Kurnool. In fact, it embraces all the infected districts in the Presidency except South Canara and Cuddapah. I reported separately that neither of these districts could be visited without an undue Tour.

degree of inconvenience. My tour also included visits to Bangalore, the Kolar Gold Fields, Madras and Trichinopoly. Bangalore and the Gold Fields were visited under the orders of the Government in the hope of obtaining valuable information in regard to disinfection and other remedial measures. Madras and Trichinopoly are the two most important cities lying on the borders of the infected area and are also the head-quarters of several gentlemen whose views it was desirable to ascertain in person.

4. The best means by which I could obtain information formed the subject of anxious thought and of frequent discussions with high officials, by whose advice I endeavoured to correct my own inexperience. As I hope that the information obtained will be found to have a value wholly independent of my own report, I shall set forth in some detail the methods which I have adopted for getting information and the reasons for the methods adopted.

Information to be collected from text-books,

5. He who sets himself to work to devise the most efficient and economical means of combating plague will have, in the first place, to acquaint himself with all that is known as regards the ætiology of the disease. Such information will, in the first instance, be sought for from recognized text-books, from the Proceedings of scientific bodies and from Medical articles and brochures bearing on the subject. Where such conclusions have reached the stage of general acceptance at the hands of experts, the lay enquirer will usually feel it to be presumptuous and unnecessary to go further. For example, it would be an absurd waste of time to treat as a matter for discussion the question whether Kitasato's bacillus is or is not the specific cause of the disease.

6. There are, however, points in the ætiology of Plague, in regard to which no definitely and universally accepted conclusions have been arrived at. The third question (for example) on which a report is called for is one to which no universally accepted reply has been given by any recognized authority. In regard to such questions, a lay enquirer cannot possibly give an answer which will be final and conclusive: he may, however, if fortune favours him, be able to collect sufficient data for the purpose of forming a provisional conclusion, which may in its turn form a working basis for practical administration, subject, of course, to such future modifications as advancing knowledge may suggest or dictate.

7. The requisite data were grouped by the Indian Plague Commission under two heads, bacteriological and epidemiological. The bacteriological work will, as a rule, be embodied in text-books, etc.; the evidence derived from ordinary experience, on the other hand, though partly ascertainable from the same sources, will be found to allow of much augmentation. Much enlightened observation has, in the course of the last seven years, been bestowed on plague by observers, both doctors and lay-men, who have not taken the occasion of formally embodying in writing their conclusions and the evidence on which they rest. Many of the gentlemen whom I have consulted have very strong views on recrudescence and other matters in connection with the ætiology of plague, conclusions to which their local experience gives considerable evidential value.

8. Many observers have neither the time nor the taste for generalizing, but, merely in their capacity of accurate and trustworthy observers, they will be able to recall and communicate facts, which may be found to have an important bearing on issues which they themselves have never consciously raised. There are few branches of the administration which do not stimulate in a high degree the power of weighing and appreciating evidence.

from witnesses

9. Thus, in order to arrive at the most satisfactory conclusions as to the ætiology of Plague which the circumstances admit of, the evidence of various witnesses has to be taken. In Appendices III (*a*), III (*b*), III (*c*), III (*d*), I give lists of the witnesses examined by me. In Appendix III (*a*) they are classified by districts, in Appendix III (*b*) by professions, in Appendix III (*c*) by race and in Appendix III (*d*) according to the method of examination. The reason for these four classifications will be apparent in the sequel.

10. I have endeavoured to supplement the evidence of witnesses by my own observations. The results of my local observations are partly embodied in the notes of discussions, but the more elaborate of them form the subject-matter of separate notes. They are printed as Appendix IV to this report. *and from personal observation.*

11. This portion of my evidence is necessarily fragmentary and may be misleading in so far as it bears on questions of ætiology. Even a single bacteriological examination may be conclusive within its own limits, proper care being presupposed: but an inference based on a single observation from ordinary life and one resting in some degree on human testimony and on an estimate of probabilities has small evidential value and may even do harm by unduly influencing the mind of the observer. The Law Courts hold that a local inspection is of use to enable the Judge to know what the witnesses are talking about, but that, in so far as it puts the judge into the position of a witness in the cause which he has to decide, it is harmful. I am almost inclined to look on my Ilitorai and Hadagalli inspections in much the same way.

12. The last five paragraphs contain a complete summary of the kind of evidence which I have collected on ætiological matters. A word is necessary to explain why I did not supplement it by endeavouring to obtain the evidence of the ordinary villager, who is, as a rule, the only direct eye-witness to the circumstances which attend the development and spread of plague. In the first place, formal local enquiries in two or three villages would, apart from anything else, suffer from the defects alluded to in the last paragraph. Enquiries on a sufficiently large scale to have made the results of the smallest value would have been a labour of years rather than months. Further, the witnesses, in most cases, would have been speaking of events which occurred long before. Lastly, the average villager, by reason of his ignorance, mendacity, distrustfulness, prejudice and lack of power of accurate observation is wholly unfitted to assist any enquirer by his formal testimony. He has many excellent qualities, but there is not a worse witness in the world on a matter of this kind.

13. The testimony of the numerous witnesses examined represents the evidence of the villager clarified and rationalised. Eccentricities have vanished: inspections have done something to correct misrepresentation, and the accumulations of individual instances have enabled the enlightened observer to generalize (consciously or unconsciously) and thus, in the result, to be a better judge than the villager as regards even the cases with which the said villager is directly concerned.

14. I now come to the consideration of those practical questions of administration on which my opinion is called for and in regard to which questions of ætiology are merely subordinate and preparatory. In regard to these, the text-books cease to be conclusive evidence and can only rank as more or less suggestive and important contributions. The two text-books which I have studied are Sir Patrick Manson's 'Hand-book on Tropical Diseases' (Revised edition of 1903) and Major W. E. Jennings's 'Manual of Plague' (edition of 1903). Sir Patrick Manson's position as an authority on Tropical Diseases is perhaps unique: but he writes from an European stand-point and it is no part of his work to decide how far this or that administrative measure is practicable with reference to the local conditions of India. His remark that "the safest and most thorough form of disinfection is "by fire" seems to me, if I may venture to say so, profoundly true from the scientific point of view, but it is for the administrator to take *all* points of view into consideration and shape his course of action accordingly. *Text-books studied.*

15. Major Jennings again is a Bombay Officer, and the circumstances of one Presidency must of necessity differ largely from those of another. As regards the Indian Plague Commission, I may venture to say without disrespect to that eminent body of men that seven years of practical working of Plague have enabled us to know the measure of our powers and resources to an extent which would have been impossible in 1899.

16. I trust that nothing that I have said will tend to obscure the respect and gratitude with which I have endeavoured and shall endeavour to avail myself of the views of the eminent authorities cited above. I am simply trying to show that, in

matters of administration, their views must be taken as suggestive rather than authoritative. The same criticism applies to the various cuttings of a narrative, critical or controversial nature from the *Lancet,* the British Medical Journal, etc., which are printed as Appendix V to this report. They constitute an attempt to bring discussions on matters of Plague up to date from the scientific stand-point.

17. Putting scientific questions aside, the best judges as to the efficiency, desirability and practicability of the various plague measures in force must necessarily be men of local experience and primarily the heads of the various districts affected. In questions of this description, an ounce of experience is worth a pound of theory. Moreover, the most valuable type of experience is that which is coupled with responsibility. From this point of view, the views of Collectors and, in their degree, of District Medical Officers are of unique importance.

Method of obtaining evidence, official

18. This is an appropriate place in which to describe my method of collecting evidence. Each Collector of an infected district was furnished with some copies of the questions printed in Appendix I and informed that they indicated the subjects on which information was required. He was also requested to select suitable witnesses within his jurisdiction whose opinion on such questions would be of value. A separate copy was sent to District Medical Officers. Particular stress was laid on the desirability of getting witnesses from the ranks of those Revenue and Sanitary Subordinates whose experience and capacity would render their evidence of value.

and non-official.

19. Stress was also laid on the desirability of including in the list of witnesses such non-officials as had interested themselves in plague measures and especially those whose position on Municipal or Local councils had brought them in contact with Plague as a part of their daily work. My evidence, as will be seen from appendix III (*b*), includes the statements of 43 non-official witnesses.

20. The special value of non-official evidence lies in the fact that non-official witnesses approach the subject from a somewhat different stand-point. The official, as an official, is concerned with the execution rather than the criticism of the measures enjoined, and, further, the elements of efficiency, economy and practicability will tend to weigh a good deal more with him than the doubtless subsidiary but still important question of popularity. The non-official seldom has equally full materials to his hand to enable him to decide on the final objects of the measures adopted, whilst, on the other hand, he will be far more highly sensitive in regard to the effect of those measures on the popular mind and in regard to the influence of those measures on the persons affected thereby. These are of course mere generalizations. Numerous individuals of both classes can avoid the tendencies caused by their position, but the tendencies exist, and I think that they justify me in making the broad distinction indicated above in regard to the evidence collected. Further, the non-officials are in a broad sense the spokesmen of the mass of the people who cannot speak for themselves. Even when it is not found desirable or possible to accede to the wishes of the mass of the population, it would at least seem highly desirable to know what they are. Allowance must, in any case, be made for the fact that the views which are most opposed to our own are possibly those of persons who are not represented at all, but *ex hypothesi* such views are devoid or nearly devoid of enlightenment.

21. How far popularity and unpopularity are to be the measures of our policy is a different question and can best be considered in detail in the body of the report. Here I am only concerned with the question of the selection of witnesses.

22. The bulk of the evidence taken is that of Europeans and Eurasians (85) and Hindus (45). Five Muhammadans were examined. These figures do not of course afford an absolutely accurate index of the extent to which the Muhammadans as a community take part in the administration of the country, but they tend to indicate the comparatively small extent to which the Muhammadan community has helped to guide the Plague policy of the Presidency by direct administration or by enlightened representation. The circumstance is unfortunate, having regard to the fact that our Plague policy would seem to be peculiarly distasteful to that community. This question, however, lies outside the scope of my report; I only

wish to point out that the comparatively small number of Muhammadan gentlemen examined is simply due to the fact that there were comparatively few of them to examine.

23. Evidence (except as regards Mysore) was limited to this Presidency by the terms of my order of appointment. I am, therefore, unable, except in the most general terms and with considerable reservation, to employ the method of comparison in viewing the success or failure of the various plague measures adopted in this Presidency.

24. Amongst the non-officials consulted were the President of the Chamber of Commerce and the Agents of the Madras and South Indian Railways. By the courtesy of these gentlemen, I am enabled to append statements showing the opinions of representative members of these three important bodies.

25. When such a course was found possible, evidence was taken by means of conferences or discussions, my notes being afterwards transmitted to the officers consulted for any emendations that might be found necessary. Of the 135 gentlemen consulted, 95 were examined in this way. Appendix VI-A consists of the notes of personal discussions and conferences. Appendix VI-B consists of some supplementary notes in writing communicated by the same gentlemen. Appendix VI-C contains the answers to my questions (Appendix I) forwarded to me by gentlemen whom I was unable to meet.

26. The advantage of the method of oral discussions over any other method seems too obvious to require discussion, but I cannot refrain from alluding to the readiness (I might say, the enthusiasm) with which the various officers concerned placed their time and energy at my disposal in the midst of the multifarious duties in which I unavoidably interrupted them.

Local inspections.

27. The bulk of my local inspections (Appendix IV) dealt with the work done by the passport-examining officers and the circle staff in connection with the work of tracing out defaulters. This will be discussed under the appropriate head.

28. In addition to the administrative and Medical officers now on duty in infected areas, a variety of witnesses who have had experience of Plague in the past were consulted, so that the list of witnesses includes almost everyone in the Presidency who is entitled to speak with weight on matters connected with Plague administration. Unfortunately, the bulk of these witnesses had to be asked to give their evidence in writing. To examine them all in person would have involved touring over almost the whole Presidency [Appendix III (*a*)].

29. I have availed myself of the opportunity afforded me by my stay in Madras, to consult the Sanitary Commissioner, Colonel W. G. King, C.I.E., on various points of administration; he has kindly given me all the information and assistance at his command. His views are "writ large" in the Plague administration of nearly half the Presidency as well as in various Government publications and orders. They will be alluded to, as occasion arises, throughout the report.

30. My last conference was held at Ootacamund on 10th August 1904 and corrected conferences and written answers to my questions continued to come in until 22nd August 1904.

PART II.

Classification of Subjects.

The subjects on which I have been directed to report are noted in the first paragraph of the report. In dealing with them, I propose to take them in the order which convenience and the general treatment of the whole subject require. At the end of the report I shall summarize my conclusions on the special questions referred to me. I propose also to make a somewhat free use of the latitude allowed me by clause (10). I will now explain the grouping of the report as a whole.

Quarantine system of protection a failure.

2. Plague is an infectious disease and its "prophylaxis, like that of other "infectious diseases, has to be considered from the stand-point of the community" (Manson). There is, so far as I am aware, only one way in which the community can be *completely* protected from an infectious disease. This is by the immediate discovery of the infected area and by its immediate segregation from the rest of the world, that is to say, by a rigid cordon or quarantine system. This method was resorted to more than once in other presidencies. The Indian Plague Commission examined the evidence on the point very fully and found that, unless the circumstances were most exceptionally favourable, such a measure was doomed to failure. (Indian Plague Commission's Report, V, 399.) It would be useless to discuss the matter further.

The present method the only alternative.

3. Putting cordons aside, I can find only one other method of protecting the community from plague. This consists of measures put in hand with the combined objects of (1) obtaining the earliest information of each case of real or suspected plague, (2) segregation of the patients, (3) sterilizing the area of infection. Broadly speaking, this is the policy which Government has adopted during the last seven years. Whether it has "produced results which are commensurate with the "expense involved" is a matter which can be best discussed at the conclusion of my report. At this point, it is only necessary to make two observations: *first*, that I know of no alternative policy by which the protection of the community as a whole can be so much as attempted; *secondly*, that each portion of this policy is inextricably bound up with the others. If we are to treat plague effectively, we must have immediate knowledge of its occurrence; if we are not prepared to deal with it in the most efficient manner of which the circumstances admit, there is (from the stand-point of the community) no use in our knowing of its occurrence.

The *laissez-faire* attitude.

4. There is, of course, an alternative attitude for a Government to assume; all attempt to protect the community, as such, may be abandoned and the interference of Government may be restricted to the treatment of individual cases of plague and the performance of inoculation in cases in which any given individual desires such treatment or inoculation. Whether this alternative is a desirable one will be discussed in due course. Here I merely wish to submit that it is the *only* alternative. I shall, therefore, base my report on the assumption that a combination of (A) remedial measures [clauses (2) and (3), paragraph 3 above] and (B) preventive measures [clause (1), *ibid.*] is the only practicable way in which plague can be dealt with from the stand-point of the community. I shall further assume that compulsion must and should be resorted to in support of such measures, except in so far as (1) the community are able and ready to carry out the measures themselves or (2) the measures are so violently opposed to public opinion that the attempt to enforce them would defeat its own object. This assumption is in fact involved in the assumption that a plague policy is desirable at all. There are undoubtedly persons who would claim to be considered rational and who complain bitterly because the whole population of India are not allowed complete freedom to infect one another with plague if so disposed ("A common-sense plague policy for India" compiled from a series of articles in the *Pioneer*), but to deal seriously with a grievance of this kind is a task beyond my powers. The question of freedom or compulsion is, in my view, simply a question of expediency and practicability and can best be dealt with from that point of view in dealing with particular measures.

Matters to be treated of in the report:

5. My task, therefore, resolves itself into (A) an attempt to ascertain the best practicable system of disinfection, using that term in the widest possible sense,

(B) an attempt to ascertain the best practicable system of securing information of plague cases, (C) a brief criticism of the alternative policy suggested in the last paragraph.

6. So far as group A is concerned, I shall, in the first place (Part III), endeavour to set forth what is known or can be inferred with more or less probability in regard to the manner in which infection is spread and communicated. Such an attempt on the part of a lay-man is, I fear, foredoomed to failure, but the attempt must none the less be made, for, in the first place, the ascertainment of all possible sources of infection seems an indispensable preliminary to an intelligent discussion of the methods of disinfection; in the second place, the question of the general infectibility of plague is intimately associated with the question of recrudescence, on which I have been directed to submit my conclusions; in the third place, the poverty of the results will at least serve to emphasize the necessity for detailed research in regard to the many important ætiological questions which must still be regarded as open. remedial measures,

7. In Part IV, I shall discuss the value of the different chemical and other disinfectants: in Part V, I shall set forth the evidence in regard to rats and other animals as conveyers of infection within and without infected areas: the subject of grain can be appropriately discussed under this head, as also the susceptibility to Plague of insects, animals, etc.: in Part VI, I shall discuss the subject of Inoculation: in Part VII, I shall endeavour to arrive at such conclusions as the evidence admits of in regard to the most effectual combination of remedial measures: the subject of Plague Hospitals can be appropriately considered in this connection.

8. This exhausts Group (A). The subjects of Rats and Plague Hospitals are not specifically mentioned in the Government Order appointing me: the influence of rats, however, is an aspect of the question which it is difficult to wholly ignore and, in view of the general unpopularity of Plague Hospitals and the fact that they are an indispensable part of the general scheme, a few notes on the matter may serve a practical purpose.

9. Evacuation and the segregation of contacts I have not treated as open questions. Evacuation is one of the few Plague questions on which everybody is in agreement. The text-books speak highly of the measure (Manson, 254; Jennings, 184, 193–5), and the Indian Plague Commission not only proved that the measure was a beneficial one, but also noted that this was the opinion of officials and villagers alike (Indian Plague Commission's Report, V, 351–2). It is moreover perfectly obvious (1) that, if plague germs die of their own accord without the support of an animal organism, the temporary abandonment of an infected village prevents them from doing the harm they otherwise might during their brief saprophytic existence; (2) that, if they do *not* die unless artificially destroyed, the temporary evacuation of the infected area gives the best possible chance to the authorities of effecting their destruction by artificial means. The advisability of evacuation has been demonstrated with more precision and detail by Colonel King in paragraphs 123–127 of the Plague Inspector's Manual (edition of 1903, Madras Government Press).

In these circumstances, I submit that it would be useless and inexpedient for me to treat this question as an open one. I may note, however, that numerous instances have been casually brought to my notice in which villagers in this Presidency have voluntarily evacuated their villages on a suspicion of Plague, the practice being especially prevalent in the infected portion of the Salem District—*vide* Appendix VI *passim*.

10. There is one subsidiary question in regard to evacuation, which is far from being settled, namely the evacuation of large towns. Major Jennings remarks that difficulty has been found to arise in practice where the population exceeds 10,000 people. The Plague Commission, on the other hand, think that evacuation is least efficacious where the population consists largely of traders. I do not consider that it would be practicable or desirable to lay down hard-and-fast rules. Each case must, I think, be decided in accordance with the special attendant circumstances. Again, the extent to which the nature of the surrounding soil and the state of the season allow of evacuation on any particular occasion is a question of administrative detail regarding which general rules seem unnecessary.

11. The question of the segregation of contacts has recently formed the subject of an order of Government, and it is therefore unnecessary for me to touch on it.

preventive measures

12. In regard to Group (B) I shall first (Part VIII) discuss in general terms the passport system and the system of observation now in force and consider whether any fundamental alteration is called for in these systems. I shall also discuss such changes as have been proposed in the details of the working of the passport system. In Part IX, I shall endeavour to ascertain whether any alteration is called for in regard to the recruitment, training, pay and duties of the staff and, generally, whether any administrative changes seem called for in this connection. In Part X, I shall deal with a few points of detail, such as the Examination of Corpses, the Constitution of the Plague Police and so forth. I have been separately ordered by Government to report on certain points in connection with the Plague Police. I may note here that the alleged insecurity of the property left behind in villages or towns during evacuation has been pressed on me as one of the chief hardships, if not the chief hardship, arising from the measure.

and general criticism of the present plague policy.

13. So much for Group (B). In Group (C), I shall endeavour (Part XI) to answer the questions whether our Plague Policy has justified itself by results and whether it is worth the expenditure of the money, time, energy and (sometimes) life involved. To raise such a question may, perhaps, seem presumptuous, but, if the position set forth in paragraphs 3 and 4 above be accepted as sound, the discussion of the soundness of our Plague Policy would seem to be the only efficient method of dealing with the question raised at the conclusion of paragraph 5 of my order of appointment, and I would also shelter myself behind the last clause of the last paragraph of the same order. In any case, here as throughout my report, I shall endeavour to restrict my conclusions to those which seem to follow irresistibly from the evidence before me, though I fully realize that that evidence is capable of considerable expansion and that, even as it stands, it would probably lead many enquirers to form conclusions which differ widely from my own. In the concluding portion of this section, I shall endeavour to answer *seriatim* the specific questions on which I have been directed to report.

PART III.

INFECTION.

Channels of infection: the mouth, lungs and external surface of the body—Plague contrasted with cholera—Types of plague: bubonic, pneumonic and septicæmic—Infectivity of plague patients and convalescents—Retention and conveyance of infection in rats and other animals, the soil, cloths, grain, etc.—Chemical disinfection necessarily imperfect as a sterilizing process—Recrudescence: bacteriological evidence: opinion of experts: inferences from epidemiological observations: conclusion—Period of recrudescence: effect of climatic conditions—Does the bacillus penetrate below the surface of the floor?—Effect of sanitary conditions: relative immunity of Europeans.

"THE varying groups of manifestations which are included under the general "term 'plague' depend for their inception and development upon the presence in "the organism of . . . . the bacillus . . . . discovered by Kitasato and "independently by Yersin in 1894." The principal channels by which infection can be and is introduced into the human organism are the skin, the nostrils and the mouth. The order in which I have placed them is also the order of their importance. All the authorities are agreed in regarding the skin as the principal channel of infection. The unbroken epidermis cannot act in this way, but the smallest abrasion, puncture or other breach of continuity suffices for the introduction of the bacillus. Channels of infection :—

2. Whether infection is ever introduced through the mouth cannot be considered certain. Major Jennings (p. 63) considers that infection very rarely comes through the intestinal canal, and the Indian Plague Commission arrived at a similar conclusion, having failed to meet with any authentic cases in the course of their enquiry; Dr. J. Ashburton Thompson of Sydney observes, in the course of a remarkable article on Plague in the Lancet (to which I shall have frequent occasion to refer), that "there is practically no pathological evidence that man is infected by "feeding": the trend of the article seems to show that the word "feeding" is intended to apply alike to food and drink. Colonel King again (Plague Inspector's Manual, paragraphs 12 and 22) only regards infection by means of the intestinal canal as *probable* and remarks that authorities are not agreed on the point. the mouth and intestinal canal.

3. Two instances were given me in the Salem Conference in which a well was believed to have helped to spread an epidemic and in one of which the disease "broke out in an abdominal form which was for some time mistaken for cholera." Doubtless, water can support the plague bacillus for a few days (Jennings, 33), but the consensus of opinion renders it certain that infection by this means must be most uncommon.

4. Sir Patrick Manson quotes the case of Hong-Kong, where rats were examined in connection with the epidemic of 1902 and bacilli were found in the mucus and intestinal contents of about one-third. Putting aside the curious fact that bacilli seem to have been found in Hong-Kong, under an extraordinary number of different conditions, though bacteriologists in other parts of the world have not been equally fortunate, it seems sufficient to observe in this connection that rats appear to at once develop the septicæmic type of plague (*vide* Dr. Ashburton Thompson's article and also Captain Gordon Tucker's recent article in the Indian Medical Gazette) in which bacilli may be present anywhere and everywhere, irrespective of the original source of infection (Jennings, 34).

5. The question as to whether the mouth itself is a source of infection is slightly different. Colonel King, Captain W. H. Tucker (Salem) and Dr. Elliot (Kolar) are inclined to favour this view (*vide* also Part V, paragraph 52): but the evidence on which they rely seems to turn mainly on a preponderance of infection in the cervical glands under certain conditions and in certain subjects (especially children). Captain Niblock would attribute this peculiarity in the case of children to their perhaps scratching their heads with dirty finger-nails, the infection finding an entrance into the organism through an eczema, with which children are frequently afflicted. It was also suggested to me that a flea would be very likely to attack the neck (this being a tender part of the skin) and thereby affect the same glands. This

raises the question of flea-infection somewhat prematurely; all I would point out here is that evidence derived from alleged preponderance of affection of the cervical glands is capable of too many interpretations to warrant any conclusion from it in favour of the theory that the mouth is at all a common source of infection.

6. My conclusion is that, as the evidence now stands, we are justified in regarding the mouth as an extremely rare, if not negligible, source of infection. It is perhaps worth alluding to one or two cases in which Collectors, in their monthly narratives, have reported the eating of infected rats as a source of infection. It is obvious that the preliminary handling of the raw rat during the process of preparation is more likely to have been the cause of the infection than the subsequent eating of the (presumably) cooked animal.

(Plague contrasted with cholera.)

7. This seems a suitable place in which to allude to the curious advice given in some quarters that we should treat plague like cholera. Cholera is essentially (though not perhaps technically) a disease communicable through the mouth by the medium of drinking water, and its prophylaxis is a matter of extreme simplicity, its danger lying in the suddenness, rapidity and severity with which it attacks a locality. Plague, on the other hand, hardly attacks the mouth at all, but is communicable, at any point on the external surface of the body, by means which are as yet only imperfectly determined. When the method of infection in the two diseases is so radically different, no possible inference as to the appropriate method of treatment can be drawn from the one to the other. Colonel King (paragraphs 123 to 126 of the Plague Inspector's Manual) has dealt with this question fully and conclusively. Those who think that cholera and plague are analogous diseases in any sense of the word will find some difficulty in explaining why, out of three towns situated at short intervals on the banks of the Pálár, the two lying higher up (Vániyambádi and Ambúr) should have been afflicted with plague, whilst Gudiyáttam (lying below them) has escaped year after year. It may be confidently stated that such a conjunction of circumstances would be inconceivable in the case of cholera.

The lungs,

8. There is little to be said as regards the lungs. Doubtless, as Captain Niblock observes, they are probably the chief source of infection in the pneumonic variety of plague—putting aside, of course, the cases (probably far more numerous) in which such infection is communicated from one patient to another; but the Indian Plague Commission have commented on the fact that "plague pneumonia "has apparently been of extremely rare occurrence among disinfectors, who are by "the nature of their occupation very much exposed to the inhalation of dust." The apparent inference is that the lungs are not very susceptible to infection, except when it is conveyed from other patients.

9. I may note in this connection the experience of Mr. Richards (Salem Conference) who "noticed that there was always an abrasion of the skin in cases in "which disinfecting coolies were attacked by plague and . . . . that the position "of the gland affected was always that which might have been expected, if the "abrasion had been the source of infection." A Deputy Tahsildar and a Supervisor of the Nilgiri district remark that, within their experience, disinfectors have always been attacked with the *Bubonic* type of plague. I infer from all these circumstances that the lungs, as (so to speak) an *original* source of infection, have comparatively little importance. Captain Gabbett is strongly of the same opinion.

the skin.

10. The question whether the skin is the really important source of infection was made the subject of comprehensive enquiry and ingenious inference by the Plague Commission. They seem to have shown conclusively that "primary buboes "practically always develop in connection with lymphatics originating in the skin", from which fact they draw the broad inference . . . . "that the system is "invaded for the most part not from internal sources but from the skin." This inference they materially strengthen by proving "that primary buboes are found "with greater or less frequency in the various regions of the body, according as "larger or smaller areas of skin surface drain into the glands of the region affected." The conclusion would seem to be that, so far at any rate as Bubonic Plague is concerned, the skin is the only channel of infection which need be taken into account.

11. The practical experience of almost all the Medical officers whom I have consulted has led them to a similar conclusion. There is, however, considerable difference of opinion as regards the relative importance of the various parts of the body as channels of infection. Captain Gabbett is disposed to attach great importance to the fact that natives, as a class, eat with their hands and from the floor. Captain Niblock considers the frequency of eczema round the waist in natives and their habit of scratching the part affected would account for the fact of the inguinal rather than the femoral glands being so frequently affected. Dr. McCaully Hayes makes a similar observation and deduction in regard to the scrotum. What may be called the popular view is undoubtedly that the feet are the common source of infection, and it is thereby deduced that the comparative immunity of Europeans is due to their habitually wearing boots and stockings. The various views expressed as regards the affection of the cervical glands have been set forth in paragraph 5 above.

12. The distinction between the femoral and the inguinal glands raised by Captain Niblock (and emphasized by Dr. Ashburton Thompson in the paper already quoted) would seem to have been overlooked by those who have attributed an exclusive importance to the shoeless condition of the natives of this country as an explanation of their comparatively high susceptibility to plague. If we accept the conclusion of the Plague Commission that the frequency of the buboes is in proportion to the areas which feed them, it is plain that the conditions of increased susceptibility on the part of the Hindu must be fairly equally distributed over the whole of his body, and the observations quoted in the last paragraph would seem to show that they extend from the crown of his head to the soles of his feet. I speak, of course, of the natives of the country taken in the aggregate: it is quite possible that particular classes of natives may show a considerable relative immunity to the disease and may challenge comparison with Europeans in this respect. I have no statistics which would enable me to pronounce an opinion on the point. I shall endeavour to sum up the evidence as regards the effect of sanitary conditions on plague in a later portion of this chapter.

13. The infection, conveyed through the channels indicated above, displays itself in three varieties of plague, the bubonic, pneumonic and septicæmic types. The main feature of the bubonic type is the characteristic glandular swelling. All the authorities are agreed in holding that this form of plague is only mildly infectious in the initial stages and in convalescence. Such is also the opinion of all the Medical officers consulted by me. Captain Cornwall, however, notes that, if the bubo is cut, a source of infection is at once liberated, and the text-books draw attention to indolent ulcers, sometimes taking months to heal, as a feature of convalescence. Types of plague:— bubonic,

14. Whether the blood of the patient in an uncomplicated bubonic case contains plague bacilli must be considered an open question. Major Jennings remarks that it is extremely rare. Dr. J. Mitford Atkinson, writing from Hong-Kong, finds the bacillus in the blood, but the experiments of Captain Cornwall, Captain Niblock and Professor Gaffky (quoted by Captain Niblock) led to negative results. Governor Sir H. A. Blake (Hong-Kong) is of opinion that men may suffer from *chronic* plague, or in other words that their blood may habitually contain plague bacilli, even while they are in a perfectly sound state of bodily health. This terrible conclusion, coupled with the acceptance of the theory that suctorial insects transmit plague, naturally led Sir H. A. Blake to the conclusion that all plague precautions were useless in a locality once infected with plague. The whole subject unquestionably demands careful research: but, meanwhile, the Hong-Kong views as to the presence of the plague bacillus in the blood in ordinary bubonic patients and in healthy patients may, I think, safely be regarded as unproved and opposed to common experience. If all plague patients and an indefinite number of healthy persons were continual sources of infection, it is clear that the spread of the disease would be absolutely unmanageable and uncontrollable, and this is very far from the inference which I draw from the actual facts, so far as this presidency is concerned.

15. In unfavourable cases of bubonic plague, the bacillus escapes from the bubo and enters the blood stream, causing septicæmia (blood-poisoning). Sometimes,

septicæmic. the septicæmia, instead of supervening on the bubonic type, is the form assumed by the disease from the beginning: in any case, the septicæmic stage is almost universally fatal and rapidly fatal. During its progress, the patient is highly infectious, by means of his blood, mucus, etc. His excreta are probably infectious also. In connection with the Hong-Kong epidemic in 1902, bacilli were found in the urine of a small proportion of the rats examined (Manson, 240), but the authorities seem to doubt whether it would be practicable to separate off the plague bacilli from the many contaminating micro-organisms contained in the excreta (Jennings, 89). Dr. Elliott (Kolar Notes) examined urine for plague bacilli and obtained negative results. Colonel King, however, (Plague Inspector's Manual, 14, note 2) considers it safest to assume that the excreta contain bacilli.

16. As to the exact degree and duration of infection during the period of convalescence, I find it impossible to express any opinion. All are agreed that a patient who recovered from a mild attack of septicæmia would probably continue to be infectious for some time, but most of the observers whom I have consulted consider, both on *a priori* grounds and as the result of their own experiments, that septicæmia is simply a mark of the final stage of almost universally fatal cases: on the other hand, Dr. Elliott, as the result of his own experiments, finds that the blood continues to retain infection for some time after recovery and Dr. Gabbett would have the excreta regarded as infectious on the analogy of enteric, an analogy which does not commend itself to some of the other members of the medical profession consulted by me. The Hong-Kong view has already been adverted to.

17. In the face of such divergence of expert opinions as this, it would be presumptuous for me to attempt to arrive at any conclusion. The matter is, however, one of extreme practical importance, as on its decision turns the question as to how long patients should be segregated after recovery. Personally, I think that it would be safe to continue the existing practice on the subject, having regard to the negative result of the experiments of Professor Gaffky, Captain Cornwall and Captain Niblock, detailed in paragraph 14 above, but there can be no doubt that no satisfactory conclusion can be arrived at until the degree of infectibility of convalescents is authoritatively determined by comprehensive bacteriological research. I would request that the relevant portion of the evidence of the various experts mentioned above be read in connection with this portion of my report.

pneumonic. 18. The pneumonic variety of plague is highly infectious, the sputum of the patient being charged with bacilli. In fact, as already noted, the chief source of infection in this form of plague arises from contiguity with a patient suffering from it. The rapidity with which the disease spreads from person to person is illustrated on pages 90 to 92 of the Plague Commission's Report. Captain Cornwall gives similar evidence. The Commission also discussed the question of the infectivity of convalescents from pneumonic plague and arrived at the conclusion that their sputum continued infected for a long time after convalescence. Major Jennings (p. 30) arrives at the same conclusion. Colonel King (Plague Inspector's Manual, 14) notes that "the plague microbe has been found . . . . in the sputa of "pneumonic cases 33 and 48 days after a return of the temperature to normal and "after the patient has been out of bed and apparently healthy for . . . . 19 "and 42 days respectively." If this be accepted, it seems clear that the period of segregation in pneumonic cases should be extended to two months after convalescence (using the word convalescence in the sense of the return of the temperature to normal): the risk run by the community in regard to such cases is diminished by the fact that they are not very common and are generally fatal. The figures furnished by Colonel Pemberton as regards the Plague Hospitals in the Bellary District for the year 1901–1902 may be taken as a sample: proportion of bubonic cases to the whole number 87·5 per cent., pneumonic cases 4 per cent., toxic and intestinal cases 4 per cent., mixed cases 4·5 per cent., mortality in bubonic cases 50·15 per cent., pneumonic cases 80 per cent., toxic and intestinal cases 64 per cent.; total number of cases of plague of all descriptions 378.

19. I have now briefly adverted to the different types of plague, with no pretence to scientific completeness, but with the sole object of setting forth their infectious characteristics and (incidentally) endeavouring to ascertain whether the

latest views on the subject demand any alteration in our present plague policy. The chief means by which the patient can communicate infection are (1) the bubo (when cut) and the indolent ulcers which mark ordinary bubonic plague, (2) the blood, excreta, mucus, etc., in septicæmic plague, (3) the sputum in pneumonic plague (or in bubonic plague, where the mucous membrane is the seat of infection) (Indian Plague Commissions' Report, V, 93). It is quite plain, from this enumeration, that every case of plague (and especially every fatal case) needs extreme care and a thorough knowledge of antiseptic precautions, if the infection is to be prevented from spreading directly or indirectly from the patient to the outside world. That no case of home segregation can be treated with such precautions, unless the circumstances are most exceptionally favourable, seems to need no demonstration. On the other hand, there is a gratifying unanimity on the part of the authorities and the medical witnesses consulted, which shows conclusively that, so far as doctors, attendants, nurses, relations, etc., are concerned, patients in Government plague hospitals can hardly be considered a source of danger at all. Throughout his experience in the hospital at Malir (perhaps the most important plague camp ever established), Captain Niblock can only recall one case in which an attendant caught the disease, and the infection in this case is believed to have come from an outside hut on the premises.

Infectivity of patients, counteracted in Government plague hospitals,

20. I need not enlarge on the conditions of home segregation from the point of view of infectivity, the lack of light and ventilation, the cow-dung floor, the carelessness and ignorance in regard to the disposal of cloths, food, excreta, etc. Let one instance suffice. Captain W. H. Tucker recalls a case in which, in his presence, a native doctor, after cutting open a bubo, wiped his knife on his cloth and seemed satisfied that he had complied with all the sanitary requirements of the case. I have the testimony of witnesses from most of the plague-infected districts to show that, whatever be the opinion of the few, the large majority of the population trust implicitly to the treatment of these unqualified doctors, where they resort to treatment at all. Whatever conclusions are arrived at on the more obscure aspects of the ætiology of plague, it seems fairly clear that home segregation is incompatible with the observance of even the most ordinary and obvious sanitary precautions to check the spread of the disease. Other facts and arguments bearing on this subject will be noted, as opportunity arises.

increased by the practice of home segregation.

21. So far, I have endeavoured to enumerate the chief methods by which a patient receives infection and the chief methods in which he can communicate infection to the outside world. What is the typical intermediate history of the plague bacillus? The obscurity and uncertainty hanging over this part of the subject are extreme, but a few salient points present themselves at once. I put aside as hopeless the case of home segregation and will take a case in which the authorities have received more or less early intimation of the existence of a case of plague and in which the patients and contacts have been removed from the house in which the infection originated.

22. That the contacts may have conveyed infection to other houses by means of cloths, etc., is of course possible but not, I think, very likely. If the case is an early one in the history of the epidemic, the infection has probably been brought from elsewhere and any case of sickness will be viewed by the neighbours with considerable suspicion. It is unlikely that any but near relatives will have willingly received either the attendants of the sick person or their cloths. We may, therefore, take it as likely that the infection, in so far as it is transmitted to other parts of the town, is usually transmitted by other than human agency.

Conveyance of infection—by men,

23. The patient, as already ascertained, will be mainly infectious by means of excretions of various kinds, which will stain his cloths, the floor of the rooms, the furniture of the house and possibly the cloths of the attendants. Prior to the arrival of the Government authorities, it may be assumed that none of these probable recipients of infection will be treated antiseptically. That the germ will live *for a few days* under such conditions is doubted by nobody. When the disinfecting staff take charge of the house, all the articles mentioned above and any other goods found in the house are disinfected, and the floor and the lower part of each room are treated with the disinfecting solution. A hole is frequently made in the

in houses,

roof also. I pass over, for the present, the practical question whether disinfection, as practised in this Presidency, is a completely sterilizing agency. The point now to be considered is whether the measures taken are *theoretically* perfect.

by animals.

24. This would only be the case, if plague were a disease confined to the human being and if no other animals, insects, etc., were susceptible thereto: nay, I may go further and say that the measures could only be considered perfect, if no other animal but man could act as a carrier of infection. Now, putting aside all doubtful questions, I need go no further than the Plague Inspector's Manual, paragraph 9, to show the susceptibility of rats, mice, cats, squirrels and monkeys. Native houses are usually over-run with rats. Mice are not infrequent visitors. Cats are often kept by natives, either from affection or with the definite object of catching rats. Monkeys and squirrels often enter houses, and the monkeys are described as a positive nuisance.

25. In the interval elapsing between the attack of plague and the advent of the Plague Inspector and even in the subsequent interval between his arrival and the process of disinfection, there is ample opportunity for all or any of these animals (and especially rats) to convey the infection in a hundred different ways to a hundred different places. Nay more: the very house itself may continue a source of infection long after the completion of the disinfecting process, as noted by the Indian Plague Commission (*vide* paragraph 36 (II) of the Resolution of the Government of India printed in G.O., No. 878 P., dated 13th August 1900). Rats, mice, squirrels and vermin not only burrow under the floors of the houses but also make their abode in the roofs, especially the thatched roofs of the plains and the flat mud roofs of the Ceded Districts. The sole method by which any attempt is made to deal with this aspect of the case during disinfection is by an occasional use of tar and sulphuric acid to drive them away. I will advert to this and many other points in detail, when dealing with the subject of rats (Part V). Here, I shall merely invite attention to the fact that it is not necessary to have recourse to any obscure or disputed points, in order to show that our system of disinfection is far from *theoretically* perfect and that it leaves untouched a means of transmission of the disease, which all authorities consider to be of transcendent importance.

Disinfection an imperfect remedial measure.

26. The comments which I have ventured to make in regard to the theoretical imperfections of our present system of disinfection must be regarded as mainly parenthetical. They bear, however, on the main subject of the present chapter, in so far as they tend to show the *possibility* of the plague bacillus surviving the operation of disinfection. If I were able now to enumerate and discuss all the methods in which the plague bacillus can exist, until it again finds an entrance into the human organism, and the methods by which it can effect its entrance into the human organism, the cycle of its history would be complete and the chapter would be brought to a logical conclusion. This, however, would involve the discussion of the various theories which circulate round the subject of rats, and the importance of that subject has led me to postpone its discussion to a separate stage of the report. I shall endeavour, as far as possible, to render this logical defect of as little practical importance as possible.

Life of the plague bacillus— in animals,

27. That the plague germ can find a home in the organism of rats and other animals and can be transmitted from one rat to another rat in some manner are facts which are proved beyond all possibility of doubt by the numerous epidemics among the rat-population which have preceded and accompanied epidemics. The expression "rat-dropping" has, in Bellary and other districts, become a familiar method of describing these epidemics. Not only do they precede epidemics, but they sometimes arise and fall without any human epidemic supervening. A curious case of this kind is given by the Tahsildar of Gooty, whose report on the subject is printed in Appendix VII. It will be seen that plague did not break out amongst human beings in Gooty town until four months after the circumstances therein described. Again, the evidence at my disposal amounts to conclusive proof that rats can in some manner communicate plague to human beings. To discuss the evidence on which this assertion rests would be premature, though I hardly think that any person who has had practical experience of plague would refuse to assent to the proposition. Here then is at least one cycle of the life-history of the

plague bacillus : from the human organism to cloths or soil; thence (by some means still to be determined) to the rat; thence by one or other of the same means to other rats ; thence (finally and still by some undetermined means) to the human organism. All that we can say is that the final means of entrance into the human organism will probably be by means of some breach of continuity in the skin. Whether our present knowledge enables us to add anything to this somewhat unsatisfactory history, I shall endeavour to ascertain in Part V. The same cycle will hold good in regard to cats, monkeys, etc., or to the various combinations and permutations of these animals.

28. Those who have studied plague on the spot would all be willing, perhaps, to accept this cycle as explaining in some cases the spread of epidemics from house to house, from one quarter of a village or town to another quarter of the same village or town, or even from one village to another, but they would hesitate for the most part to accept it as accounting for an interval of weeks and months during which plague had ceased to exist among human beings and afterwards broke out again in the same or an adjacent place. There are few cases on record in which an epidemic among rats or any other animals unaccompanied by human mortality can be proved to have persisted for any considerable length of time, nor, putting aside exceptional cases, can a rat epidemic be traced from place to place for any considerable length of time without the accompaniment of human mortality. I would by no means decide these questions in the negative, but will for the present simply pass on to the question, which more immediately concerns this chapter, namely whether the plague bacillus can survive for any considerable time independently of the support of a living organism. This question has formed the subject of animated discussion, the theory that the bacillus can and does survive in this manner and that it can and sometimes does eventually result in the re-infection of a particular locality being generally known in this Presidency as the theory of recrudescence. Speaking generally, the full discussion of recrudescence and rat-infection seems to exhaust the possibilities of the history of the bacillus in its passage from one human organism to another human organism.

in cloths and the soil—recrudescence.

29. Captain E. F. Gordon Tucker, in a recent article in the Indian Medical Gazette, remarks that "we know a good deal . . . . of the action of the bacillus " . . . . in living animal tissues. We know too little, and in fact we know "nothing, of its characteristics as a saprophyte in nature . . . . We wish to "know whether the involution forms which we can produce . . . . represent "forms under which the bacillus may remain latent or non-virulent for long periods "in houses, clothing, some host other than man and rodents or the soil. Or, if "it be demonstrated that, in a town which has suffered from an epidemic and "has remained quite free for months, but again becomes the seat of the pestilence, "evidence of definite infection through some imported case is always forthcoming, "and that there is no such thing as plague re-appearing spontaneously in a "previously infected district under seasonal and other variations, then the question "arises . . . what are the peculiar local conditions which favour the recurrence "of an epidemic after definite periods of quiescence or at definite seasons of the "year in a particular locality?" When these questions can be authoritatively answered, recrudescence itself will no longer be an open question.

Bacteriological evidence.

30. The enquiry into the characteristics of the bacillus "in nature" is in practice much limited by the fact that it is destroyed by exposure to direct sun-light. As shown in paragraph 23 above, cloths and the walls and floor of the house are the chief materials likely to be directly infected by the patient: rats may doubtless carry the infection to other objects: there is no doubt that grain and gunny-bags are especially liable to be infected in this manner. Doubtless, there are many other objects of possible infection, for example, the various kinds of food in common use, but I think that the discussion of the duration of the infectibility of cloths and of the soil will be sufficiently typical: whatever has to be added in regard to grain will appear in Part V.

31. The question how long the plague bacillus can exist in cloths or in the soil might seem to be best capable of solution by bacteriological methods, but bacteriologists have hitherto been unable (apparently through the presence of contaminating micro-organisms) to recover the plague bacillus from the floor of a

native hut or from specimens of clothing (Indian Plague Commission's Report, V, 101, 357, 362; Jennings, 20, 42). Doctor Marsh made some experiments with artificial cultures, but these and all other experiments hitherto made appear subject to Captain Gordon Tucker's caustic comment that, "until bacteriologists take more "pains to exactly imitate the conditions that obtain in external nature, their experi-"ments will not help us much." Captain Gordon Tucker further points out that the results of experiments in the past have been as contradictory as the methods are unsatisfactory. I cannot refrain from quoting Captain Gordon Tucker's final remark on the bacteriological aspect of the question, "The subject is not one "which can be dismissed by a few bacteriologists placing pellets of dirt under a "guinea-pig's skin. It demands skilled and repeated investigations, carried out "with the aid of apparatus to be found in laboratories which in India could be "counted on the fingers of one hand."

Expert opinion.

32. I shall next deal with expert opinion in this matter. Sir Patrick Manson remarks, "there is a considerable mass of evidence to show that cloths, skins, "textile fabrics and other similar materials may preserve the virus in an active "state for several months" and recommends their destruction or disinfection accordingly: in regard to houses, he is less explicit, though he incidentally includes, among the conditions which favour the spread of plague, the "abundant satura-"tion of soil and surrounding media with animal refuse, fitting them as a nidus "for what may be termed natural culture of the germ." Whether this is an intentional reference to the cow-dung with which the Hindu cleans his floor I cannot say, but the description is certainly applicable to such floors, and the expressions "nidus" and "natural culture" seem to suggest that, in Sir Patrick's opinion, the bacillus might flourish for an indefinite period in a mud and cow-dung floor. Again, there is an allusion to "such germs as may be lying about on "the ground . . . . perhaps growing there in natural culture" (Manson, 239–241).

33. Major Jennings attaches weight to the experiments dealt with or performed by the Plague Commission and also the various epidemiological considerations, which point to the "very probable existence of the virus as a "saprophyte in the floor or other parts of such houses" and by means of this characteristic he is disposed to explain "the periodical recurrence of plague under "certain conditions in particular houses." Great weight must be attached to such a pronouncement in favour of the doctrine of recrudescence by an officer, whose experience would embrace the records of all the epidemics in Bombay city during the last seven years. As regards cloths, Major Jenning's opinion is the same as Sir Patrick Manson's.

34. The Indian Plague Commission sum up the conclusion, to which their enquiries and experiments have led them, in the remark that houses, cloths and other effects, once rendered infective, "may remain infective for very considerable "periods." Still more explicit are the remarks of the President, Sir Thomas Frazer: "The abundance of organic matter and moisture which the floor contains "and the frequent alkalinity of their reactions are conducive to the vitality and "proliferation of all micro-organisms, and it was therefore to be expected that "investigation would prove, as it has done, that plague bacilli are able to live for "considerable periods of time in earth and in cow-dung and in mixtures of earth "and cow-dung, constituting the materials of the floors." The Commission are also disposed to explain the undoubted endemicity of plague in the Kumaun and Gahrwal districts (at the foot of the Himalayas) as due to "the infective material "lying dormant in the soil or in the houses." The facts in connection with the renewed epidemics in that region "appear to suggest that we may here be "dealing with true recrudescences, *i.e.*, with outbreaks which originate in infective "material, which has long lain dormant" (Indian Plague Commission's Report, V, 105, 176, 481). The Commission also give some statistics of the frightful mortality which has been caused by plague, on occasions when such precautions as evacuation and disinfection have been omitted. I shall refer to these in another connection (*vide* Part XI).

35. Captain Gordon Tucker's views are expressed with caution, and perhaps full justice cannot be done to them by isolated quotations; he draws attention to

the "period of quiescence" (7 to 9 months) which exists between two epidemics in the same place and remarks that "during the latter part of the period of quies- "cence . . . . it is probable, though not proven, that . . . . the plague bacillus " . . . . exists in the state of a facultative saprophyte", and again "there is "hardly anything better established by observation and collations of facts than that "clothing may contain the virus of plague, carry it over long distances and give rise "to epidemics, many weeks or months after it became infected in the original "epidemic area." In fact, one of the chief objects of the whole paper is to enforce the probability of the theory of recrudescence and the necessity for careful investigation into the subject.

36. Coming to our own Presidency, I find, at page 3 of Colonel King's Manual, that "clothing has been capable of conveying the contagion of plague for several "weeks and perhaps even months after the period of its infection." In fact, the infectibility of cloths and their power of retaining infection for long periods and subsequently starting an epidemic are proved by such overwhelming evidence that I need do no more than briefly allude to it here and close this part of the subject. Many instances are given by the Plague Commission of epidemics in plague camps, which have been stopped by disinfecting clothes. The Kiamari case (Indian Plague Commission's Report, V, 102) and the case of the Goanese Stewards (Indian Plague Commission's Report, V, 112, Plague Inspector's Manual, page 3, note) seem absolutely conclusive. It is almost superfluous to add two cases given by the Head-quarters Deputy Collector of Anantapur, but they are interesting in themselves, are well authenticated and have arisen in our own Presidency: the details will be found in the appendix. Taking all these facts and the combined weight of authority together, I cannot hesitate to pronounce it proved that in some form or other the plague bacillus can survive for months in cloths and that at the end of that period it is capable of infecting human beings with the disease. I cannot but think that this conclusion, if accepted, makes it comparatively easy to accept the doctrine of recrudescence as a whole. In fact, I would suggest that the burden of proof is, in some degree shifted on those who deny the doctrine: it almost seems as if it lay on them to explain why the soil should not retain infection, while cloths are shown to do so. (Conclusion as regards cloths.)

37. Colonel King's expressions of opinion on soil-infection are slightly perplexing to me. In G.O., Nos. 198, 199 P., dated 27th January 1904 (paragraphs 9 to 11 of his report), he attacks with vigour and (if I may venture to say so) with complete success the doctrine that recrudescence is *inevitable*, that, as plague has "come to stay," all sanitary measures are useless and so forth. These are obviously the ideas of "the Market-Place" and could easily be refuted by an appeal to the facts: but it is somewhat surprising to me to see such crude and even wild assertions described as the "harmful theory . . . . largely adopted by the medical "profession under the name recrudescence." It is added that the term is used with "reservations" by the profession: but I cannot but think that the "reservations" are of the essence of the theory. It is to my mind rather a pity that the theory is known under the name of "recrudescence." The name concentrates attention on that portion of the theory which deals with the origin of re-infection (a matter in regard to which it is almost impossible ever to get any proof one way or the other), whereas it keeps in the background what seems scientifically quite the most important and fruitful aspect of the question, namely the history of the bacillus during the period of quiescence. Even if every case of re-infection could be shown to be preceded by a case of re-importation, I venture to say that the problems of recrudescence would lose none of their interest. In any case, the doctrine, in the manner in which I understand it, has the more or less express support of every authority (paragraphs 32 to 35 above) who has ever written on plague, including Colonel King himself (as I will endeavour to show lower down), and it also commands the more or less pronounced assent of every member of the Indian Medical Department whom it has been my fortune to meet in the course of the last two months, with two exceptions (Major Crawford and Captain Gabbett): but the element of "inevitableness" seems to be simply a popular and unenlightened interpellation and one which, so far as I am aware,

has no expert authority whatever. In fact, the strongest exposition of the recrudescence theory, as I understand it, which I have yet come across, is to be found in pages 51 and 52 of the Plague Inspector's Manual. It runs as follows: "Now, although the plague microbe has not as yet been demonstrated in infected "houses, it is unquestionable, from experiments conducted by Mr. Hankin upon "purposely infected mud and cow-dung plastered floors, that the microbe does sur-"vive within dwellings and also that it is especially favoured in its vitality by "absence of air in motion, light and the direct rays of the sun. Irrespective of "bacteriological enquiry, there is evidence that families returning to houses where "cases have occurred have again been infected, and this after the lapse of an inter-"val that would leave no doubt that the infection was not due to the original cause. "*In short, infected houses must be regarded as foci of contagion of a persistent character.*" The italics are a part of the original quotation.

38. On pages 5 and 6 of the same manual, Colonel King remarks that "a "marked peculiarity of plague is its tendency to recrudescence, that is, to appear "in epidemic form after an apparent subsidence of the disease. Indeed, it may be "regarded as a rule that, in places where the disease has been allowed to become "indigenous, recrudescence will occur." This seems to me perilously near to the doctrine that recrudescence is inevitable: a note is, however, appended to the effect that recrudescence must be regarded as a sequel of imperfect sanitary measures and generally means that the disease has been perpetuated through the medium of rats or human beings during the period of apparent decline. It would seem as if the word "recrudescence" were used in different senses in one or other of these passages: in any case, it is a pleasure to me to be able to express my entire adherence to Colonel King's view that recrudescence is the sequel of imperfect sanitary measures. Where disinfection is perfect, recrudescence could apparently only occur as a result of some form of a-bio-genesis, and I am not prepared to support any such supposition. I have, however, endeavoured to show, in paragraphs 24 and 25 above, that our present manner of disinfection offers one or two loop-holes for the escape of bacilli and I shall have to illustrate this point at greater length in subsequent chapters. So far, therefore, as disinfection is concerned, I must, with all deference, maintain the *possibility* of recrudescence: the same may be said as regards natural conditions: direct sun-light, extreme heat, desiccation or a combination of the last two agencies will destroy the bacillus: but none of these conditions exist in a native hut to a sufficient extent to be fatal to the bacillus: most of the doctors consulted think that the bacillus might well find sufficient nutriment in the cow-dung and other accidental organic deposits adhering to the floor of a native hut: here again we see the *possibility* of the bacillus surviving for an unlimited period and the consequent possibility of its taking a part (possibly a leading one, possibly an auxiliary one) in connection with subsequent outbreaks of the disease: how far the epidemiological facts support this theory I shall now proceed to discuss on the somewhat scanty and empirical data which are available.

Cases of probable recrudescence.

39. Almost every form of argument based on the alleged facts of any particular case is subject to the criticism suggested in Part I, paragraphs 11, 12 and 13. I certainly did my best to sift the evidence in the Kapagallu case embodied in my notes of inspection and do believe the case to be one of recrudescence. It is, however, quite possible that there may be some trite explanation of the re-infection of that village that may have been concealed from me by the villagers. Other cases, which various witnesses believe to afford proof of recrudescence, will be found scattered over Appendix VI. Several of them will, I think, have value, as corroborative evidence, for those who are inclined to support the doctrine on other grounds. It is very seldom that an official gets time to sift very fully the evidence in regard to any particular case of re-infection and I cannot altogether quarrel with the view of those who hold (as some of my witnesses hold) that evidence of re-importation in *most* cases is presumptive evidence that there is re-importation in all cases. At the same time, it has to be remembered that, if the villagers suffer from human frailties, so do the Sanitary Inspectors, who make the first enquiry: and I have not the smallest reason to suppose that Sanitary Inspector, P. V. Subbayya, who "first told us that there had been a history of dead rats," but afterwards "when it appeared that there had been nothing of the kind . . . . admitted

"that he had merely said so, because he supposed it must be so," was an exceptional specimen of his class. The tendency of the villagers, in short, will be to conceal the history of the cases altogether, whilst the tendency of the subordinate plague staff will be to secure a history of some kind at all costs, rather than pronounce a first case indigenous. Further, a Plague Inspector is not likely to forget the dictum laid down in his Manual that recrudescence is a sequel of imperfect Sanitary measures: he is, moreover, likely to read it as meaning that it is *his own* imperfections (and not those of the, system) which will be considered to have resulted in recrudescence; this being so, it may be safely assumed that he will seldom or never report a first case as destitute of a history of some kind, if he can possibly help it (*vide* also the note by the Sanitary Commissioner embodied in G.O., No. 821, P.R., dated 3rd June 1904). Experienced Collectors and District Medical Officers may sometimes have a pretty good idea of what inference to draw from the reticence of the one party and the volubility of the other in the circumstances of each particular case; but, on the whole, the best attitude for the enquirer to take up with regard to the origin of village infection, as ordinarily reported, is one of absolute scepticism. I would, however, express a hope that District officers, when their heavy duties permit it, may occasionally snatch a day to make a really systematic and thorough enquiry, from a quasi-scientific point of view, into the origin of promising cases of re-infection. A few records of this kind would be worth more than hundreds of stereotyped reports prepared after P. V. Subbayya's manner.

40. The best case of recrudescence, however, that I find on my notes is that of the third epidemic at Karáchi, described by Captain Niblock and also alluded to by Captain Cornwall. The sudden and simultaneous re-infection of distant quarters of a vast city is, under any hypothesis, a most extraordinary circumstance; but that all these various re-infections should be the result of so many simultaneous re-importations would seem to be an incredible coincidence. If this explanation be excluded, the causes of re-infection must be held to have been contained in the city itself, and this is essentially the doctrine of recrudescence.

41. The second epidemic at Karáchi impressed Captain Cornwall, Captain Niblock and Dr. Elliott by the peculiar way in which the course of the infection followed the tracks of the course of the first epidemic, in so much that its course might have been predicted. The same feature in the case of the successive infections of Vellore City impressed two successive Municipal Chairmen (Captain W. H. Tucker and the Rev. Mr. Chamberlain) as well as the Sub-Collector, Mr. Dutt. Captain Standage noticed the same thing at Bangalore and, in the conferences at Bellary and Hospet, I was informed that plague had broken out, year after year, in the same quarters in these two places.

42. In Bellary, the epidemics appear to have usually broken out in the grain quarters, and this might doubtless be attributed with great probability to re-importations, but it does not appear that the infected quarter in Hospet was inhabited by traders who got their stock from infected localities. In regard to Karáchi, Hospet, Bangalore and Vellore I would suggest, with deference, the following analogy. If the plague bacilli do actually sometimes survive in infected and imperfectly sterilized areas, such areas may be compared to trains of gunpowder, the powder marking the line of the original infection. The match may be a change of climate, a case of re-importation or some totally unknown cause; but, once the match is lighted, the fire will tend to follow the train. Otherwise, we must suppose that the history of the two successive epidemics has repeated itself in detail and that the same succession of causes, which led the first epidemic to follow a particular course, led the second epidemic to follow the same course. I am inclined, therefore, to take these facts as lending considerable support to the doctrine of recrudescence. Major Jennings speaks most strongly of the re-infection of particular houses as a mark of plague and considers that in such cases their destruction is the only possible remedy. Both Sir Patrick Manson and the Indian Plague Commission speak, in the strongest possible terms, of plague as a disease depending on place-infection—a disease of locality (Jennings, 44–46, 56; Manson, 244; Indian Plague Commission's Report, V, 101). The Plague Commission collected a mass of statistics (99–101, 348–352, 460–462) showing how constantly an outbreak of the epidemic followed a premature return to an evacuated village: they

also amassed a formidable body of opinion in support of their conclusion, namely that houses preserve infection for some time. This mass of evidence and expert opinion has considerable value: the evidence would have had even more value for my purpose, if the elements of possible rat-infection in the interval had been considered and eliminated. The case of Satara Jail, for example, is one on which the Commission lays great stress; but the perusal of the original evidence (Vol. III, page 187, etc.) shows that there was a possibility of re-infection by rats. I am disposed to attach more probative value to the evidence of Mr. Spencer and Major Ffrench (Trichinopoly Conference), who "as a rule, ... traced re-importation in cases "of re-infection, but . . . . know of some instances in which villages had been "badly disinfected and in which plague broke out on the return of the inhabitants "to the village."

Argument from the slow but regular spread of plague, year after year.

43. Captain Cornwall adduces the fact that plague so often breaks out in the same place year after year and with increasing severity as an argument in favour of recrudescence. I should be inclined to carry the argument a stage further. How is it that plague seems year after year to extend slowly but surely the sphere of its influence, gaining a new taluk one year, a new district another year, getting more ground in one place, perhaps losing a little elsewhere, but never making any very big jumps in any direction, backwards or forwards? Does not this suggest the inference that the intermediate hot months are a mere accident (so to speak) in the history of the epidemic and that it is only our lack of imagination and knowledge which makes us suppose that the infection is absent because inert? If every successive epidemic were really the result of a totally new set of circumstances and if there were no links binding the old and the new infections together, would not the approximate identity of the areas infected year after year amount to a coincidence little short of miraculous? What, then, are the links between epidemics? Those who are disposed to deny or minimize the importance of the theory of recrudescence have suggested that concealed or unsuspected cases of plague amongst men or animals probably supply the missing links in the chain of infection; if these suppositions had any validity, it is but natural to suppose that some evidence would be forthcoming in their support; but I can find none.

44. Moreover, it has to be considered whether these two suppositions or the supposition of recrudescence gain most support by analogy. We know that the plague bacillus *can* exist for weeks and months without organic support in clothes (*vide* paragraph 36 above): why not in the soil? We are driven by hard facts to admit (though we cannot explain) the fact that plague diminishes to an infinitesimal quantity for certain months in the year: the burden of proof lies heavily on the scientist, who bases his position on the assumed existence of a series of facts, each of which is admittedly of an highly exceptional nature and each of which has been strenuously denied and never proved, though capable of proof, if true. Even if we were to allow, for the sake of argument, that isolated and undiscovered cases of plague always bridged over every interval between apparent epidemics (and this in the teeth of an agency which at present loses an allowance when plague ceases), still the rhythmical rise and fall of the epidemics themselves would remain almost equally inexplicable, except on the assumption that the disappearance of the infection in the interval had in a great measure been only apparent. If rats had not got the assistance of an infected soil to help them in their task of spreading infection over a *re-infected* town, second epidemics would, I think, be usually much milder than first epidemics, for the rats tend to become fewer and fewer in successive years in towns attacked by plague (*e.g.*, Bangalore and Kolar).

45. It will at once occur to the impartial reader that these arguments are of a very general and somewhat vague nature, that infection frequently does *not* recur in successive years in particular places, that the course of plague within particular towns and villages is often capricious and that importation of plague by rats or human beings seems in the majority of cases to be the precursor of plague. All this I freely concede. It is for bacteriology to substitute concrete facts for analogies and probabilities: as to the non-appearance of plague in successive years in many cases (*e.g.*, Kurnool, *vide* the Conference held at that place), our disinfection is undoubtedly good, as far as it goes: why should it not sometimes

succeed in its object? In this connection, I may allude to Dr. Ashburton Thompson's strenuous attack on the theory of soil infection. In Sidney, where the Board of Health is dealing with a sanitary and law-abiding population and where measures for disinfection and for keeping houses free of rats go hand in hand, it would indeed be a surprising circumstance, on any hypothesis, if recrudescence ever occurred. Moreover, the plague bacillus, judging by the slow progress of the disease, must be a delicate organism. May it not frequently meet with stronger micro-organisms than itself and be destroyed thereby? This is, in fact, an argument which has been pressed very strongly by the Plague Commission (Indian Plague Commission's Report, V, 167, 169) and it was also urged on me by Major Crawford and Captain Gabbett as destructive of the whole theory of recrudescence. May not the bacillus simply die out in a particular area through its own inherent weakness? We must presume, on Darwinian principles, that every organism, which does not spread with intense rapidity over the whole earth, has certain inherent limitations, or disabilities counteracting the ordinary process of unlimited multiplication: in the case of the plague bacillus, we can only conjecture in a dim and imperfect way what some of them may be. We have to *assume* the existence of others, until our knowledge is greater. The facts discussed by the Plague Commission (pages 176–180) under the head of "acclimatisation" are consistent with this supposition and they also suggest that the bacillus may be gradually acquiring greater adaptability to its environment: this may well be the case. As to the capricious spread of the disease (which, by the way, may sometimes be only apparent and due to defective observation), it is to be expected that human beings or rats should sometimes play a far more important part in fashioning the course of an epidemic than whatever infection may still survive from the preceding epidemic.

46. In any case, some points must be conceded by the opponents of the doctrine: we have the testimony of almost the whole medical profession that there is nothing repugnant to science in the theory: Mr. Brodie (who combines the advantages of a zeal for natural history and a practical knowledge of plague administration) finds the theory highly probable, judging from analogy (*vide* also Mr. Graham's evidence): in order to explain many of the facts in relation to successive epidemics, we are forced either to admit the theory of recrudescence or to have recourse to conjectures which are supported by neither evidence nor probability or to invoke the aid of the miraculous and suppose that the re-infection of the same tracts year after year is mere coincidence: on the other hand, the advocates of recrudescence must admit that there are many facts which show that recrudescence is by no means inevitable and which tend to show that its action in regard to fresh epidemics is usually auxiliary rather than paramount: for myself, I would certainly limit the doctrine accordingly. Beyond some such general (and of course tentative) conclusions as this, it is impossible for a layman to go, and even to this extent I would hesitate to commit myself, but for the frank support which the doctrine has received at the hands of medical experts, who are far better judges in matters of this kind than I can possibly be. Conclusions.

47. The authorities are agreed in fixing the time of the recrudescence as *mostly* (not universally) in the rains or in the cold weather. This curious fact has apparently very little to do with the climatic affinities of the bacillus itself, for it is agreed on all hands that, considered from the point of view of locality, plague has few preferences and no exclusions. As the President of the Plague Commission significantly remarks, it "can always find its own climate *inside a house*." It has raged all over Europe in the past: it has been found half way up the Himalayas and has flourished in the depths of a Russian winter: it visits Australia and South Africa periodically and is persistent in Hong-Kong: Vellore and Ootacamund (to take our own Presidency) seem to afford it an equally congenial home (Manson, 232–3; Indian Plague Commission's Report, V, 161, 474, 479, 480; Jennings, 45, 53; King, Plague Inspector's Manual, 4 and 5). The authorities and medical experts incline to the opinion that the virulence of the germ is *indirectly* affected by the cold and rain, which, by driving the inhabitants in-doors, affect the conditions of the interior of the huts in such a way as to restore the bacillus its virulence (Jennings, 45, 53; *vide* Captain Tucker's article also). The recurrence of plague in the Influence of climate on plague.

Kumaun and Garhwal districts (paragraph 34 above) is similarly explained. The President of the Plague Commission's views are relevant on this point (Indian Plague Commission's Report, V, 176, 473). I would submit, as an alternative or supplementary explanation, that the sudden presence of an increased number of people sleeping on the floors and risking infection in various other ways (*vide* paragraph 11 above) may, by the ordinary law of chances, increase the probability of infection being communicated to one or other of them: it is impossible to go beyond conjecture, until bacteriology has taught us something of the condition of the bacillus in its state of quiescence. In any case, the mere fact that the period of the outbreak of an epidemic of plague should, as a general rule, coincide with the period at which an increased use is made of the interior of the house is one more argument in favour of recrudescence. Captain Gordon Tucker suggests a periodicity in epidemics, putting an interval of 7 to 9 months between them, irrespective of seasonal conditions. This doctrine would need a good deal of statistical evidence, which Captain Gordon Tucker may be in a position to produce. Its significance cannot well be estimated in our present state of knowledge.

Does the bacillus penetrate below the surface of the soil?

48. A point of the most vital practical importance (the ascertainment of the sufficiency of our present method of disinfection largely depends on its determination) is whether the plague bacillus remains on the surface of the floors of a hut or penetrates below it, but on this point we have no assistance either from bacteriological experiments or even from expert opinions. Sir Patrick Manson notes the fact that Yersin claimed to have found a non-virulent type of the plague bacillus 4 or 5 centimetres below the surface of the floor, but he adds that this discovery has been strenuously denied. The members of the Plague Commission consider (p. 359) that the large majority of the bacilli will be on the surface of the floor or in cracks which directly communicate with the surface, but the President (p. 508) considers that the relatively porous nature of cow-dung floors and the conditions to which their surfaces are subjected are against such a supposition. Amongst the Medical officers consulted by me, Colonel Pemberton, Captain W. H. Tucker, Captain Niblock, Captain Anderson and Doctor Elliot consider that the safest assumption on which to proceed is that the plague bacillus lies *below* the surface, in an ordinary earth and cow-dung floor. Mr. Cowie (Collector of Bellary), the Rev. Mr. Chamberlain (late Chairman of the Vellore Municipality), the late Mr. Annaswámi Mudaliyár (Chairman of the Trichinopoly Municipality at the time of his death), Mr. French (an Engineer in the service of the Madras Railway Company) and Mr. Krishnamáchári (Deputy Collector in Mangalore) believe in digging up floors. The Government of India's views in 1899 were adverse to the measures (*vide* G.O., No. 1154-P., dated 27th July 1899). Captain Cornwall is the only officer, amongst those consulted, who expresses the opinion that the measure is unnecessary from a germicidal point of view.

Influence of sanitary conditions on plague.

49. One more aspect of this question deserves some remarks. Sir Patrick Manson (paragraph 32 above) notes that animal refuse may well be a nidus for what may be termed the natural culture of the germ. Similarly, the opinion of the bulk of the Medical officers consulted by me is that the bacillus could survive for long periods in a cow-dung floor. This raises the interesting and practical question how far plague should be considered a dirt-disease. The broad facts admit of only one construction. Why was the whole of Europe periodically subject to frightful epidemics of plague up to the latter part of the Middle Ages, and why is it practically immune now? Why are Europeans in India almost immune from plague, by comparison with natives of the soil? Why are attacks of plague in Hong-Kong and India marked by such frightful severity, as compared with attacks in Australia, New Zealand and South Africa? There are no characteristics that I know of by which the parties to each and all of these three sets of comparisons can be distinguished, except by a marked difference in sanitary ideas (Manson, 231, 239, 240, 250; Jennings, 45, 49, 50, 56, 57). Sir Patrick Manson's views are worthy of quotation in full, "It may be difficult to indicate the exact way or ways in which "filth and overcrowding operate, but certain it is, as experience has shown, that in "sanitary hygienic conditions plague does not spread, even if introduced, and that "in opposite conditions it may for a time spread like wild fire. Filth and over-"crowding imply close proximity of the sick and healthy; an atmosphere saturated

"with the emanations of the sick; a lowered tone of the general health; abundant "saturation . . . . (*vide* paragraph 32 above); abundance of body vermin of all "kinds; abundance of other vermin, such as rats and mice, which serve as the "multipliers of the virus; carelessness about personal cleanliness, about wounds "of the hands and the feet, about clothing and about food, dishes and water." The subject of rats and vermin will be dealt with in Part V, but I venture to think that a sufficiently detailed account of the other aspects of the subject will be found in paragraphs 5, 11, 12, 20, 23, 24, 25, 32, 34, 38, 42, 47 of this chapter, wherein I have tried to trace out, in detail, the way in which plague is fostered by the dark, damp, ill-ventilated houses of the poorer classes of natives, periodically covered with moist cow-dung, with the floor riddled with rat-holes and the roofs full of dirt, rats, vermin, squirrels, etc., crowded at certain times of the year with inhabitants, sleeping on the floor, eating with their hands from the floor, exposing their bare feet to the floor, often afflicted with skin diseases, ignorant of sanitary precautions and trusting blindly to quacks whose ignorance is as great as their own.

50. The last paragraph may seem to be not only pessimistic and unpractical, but also superfluous. The pessimism I admit: its practical bearing I will consider lower down, but it is decidedly not superfluous, seeing that the only Commission of our fellow-countrymen that ever examined into the ætiology of plague has formulated the apparent paradox that "on consideration of everything that has "been said in connection with the influence of sanitary surroundings, both within "and without the house, on the spread of plague, it will be clear that we have "been unable to find anything in the nature of statistical evidence or in the nature "of inference from scientific observations to establish the proposition that any of "the sanitary defects referred to, or any combination of them, exercises any marked "favouring influence on the spread of plague" (p. 169). It is necessary to add that the President expressly dissociated himself from these views and emphasised the importance of sanitary conditions in the strongest possible way.

Possibility of improvement of general sanitary conditions discussed.

51. To me personally the problem of changing the sanitary conditions of Indian domestic life within an appreciable time appears perfectly hopeless: the elements of example and contrast, which result from the presence of a large European community in the country, are doubtless not wholly without effect: the diffusion of simple hand-books, showing clearly and in great detail the influence on infectibility of insanitary habits, might do something among the more intelligent; but the bulk of the people must, for many years to come, remain wholly unaffected. Europeans are not for the most part adapted to the rôle of apostles of sanitation, their habits being in the majority of cases as instinctive as those of Hindus or Muhammadans: even the travelled Hindu, who adopts European manners, will naturally have been led to do so by association and the force of circumstances in the first instance and, by the time he returns to his countrymen, his compliance with European manners will have become as much a matter of instinct as if he were an European himself: I can hardly, therefore, anticipate that his influence will be much greater than that of the European. Anything in the nature of forcible proselytism is of course out of the question. If the eradication of plague really depended on the attainment of such a standard of general domestic sanitation as would suffice to confer an immunity from plague on the population as a whole, all hopes of the disappearance of the disease would, I fear, recede into the indefinitely remote future. Be this as it may, I must, for the purposes of this report, relegate general sanitation, like inoculation, to the sphere of personal prophylaxis.

52. Though I feel bound to respectfully differ from the views quoted in paragraph 50 above, I am not blind to the fact that they embody a valuable criticism on a good deal of the scattering of effort which seems to have characterised the methods adopted by the authorities in the earlier stages of the epidemic (Indian Plague Commission's Report, V, 366). In fighting plague with the limited amount of means at our disposal, it is necessary to concentrate our fire and not to delude ourselves with the idea that a general attack on all conditions which we may regard as insanitary will in a vague way tell as against plague. Moreover, such sanitary improvements as could be prescribed by the authorities with any hope of success in the face of popular apathy or opposition would deal with *out-of-doors* sanitation, but,

as I have endeavoured to show, it is the *in-door* life of the poorer class of native which handicaps him so terribly in the struggle against plague: in regard to this, we are powerless or nearly so. We, however, in Madras, thanks to the more or less strict following, from the beginning, of the broad lines of policy described in the Plague Inspector's Manual, have little or nothing to reproach ourselves with in regard to misdirected energy of this description. Whatever useful purpose, therefore, the somewhat paradoxical views of the Plague Commission may have served in their time, it does not seem to me that they should at this stage of the history of the disease be either ignored or allowed to pass entirely unchallenged by one who (like myself) regards them as, to say the least of it, capable of considerable misinterpretation. The question whether the plague bacillus would be crowded out by the competing micro-organisms contained in a mud-floor was no doubt largely in the minds of the commissioners in connection with this portion of their report: this is an extremely obscure question, and I would only say here that the conclusions at which the plague commissioners themselves arrived (paragraph 34 above) in regard to the retention of infection in houses would seem to show that they cannot have regarded the destruction of the bacillus by this means as other than occasional: I confess, however, to finding some difficulty in reconciling the views expressed on page 176 of their report with the conclusions arrived at on pages 101 and 105. The exact action of a mud floor on the plague bacillus is one of the many points in connection with the disease which still await solution (*vide* paragraph 31 above).

Summary.

53. I have now discussed all the chief ætiological questions in connection with plague, except those problems which centre round animals and especially rats and fleas. I have also endeavoured to summarize all the information which we possess (with the same exception) in regard to the history of the plague bacillus, whether in or outside the human organism. I have also submitted my views on the question of recrudescence. I have endeavoured, at every stage, to indicate any practical results which seemed to follow from the ætiological facts discussed; I shall, however, recur more fully to the practical aspects of the question in later portions of the report.

PART IV.

DISINFECTANTS.

Attitude of the people in regard to disinfection: the disinfecting staff—Phenyl, carbolic acid, the steam-disinfector, hydro-carbon, chloride of lime, disinfecting apparatus, perchloride of mercury, boiling water—The use of fire as a disinfectant: value of chemical disinfection as a germicide—Unroofing, complete and partial—Comparison between chemical disinfection and desiccation by means of bratties as sterilizing agencies: the two methods compared, as regards practicability, expense, convenience and popularity—Conclusion as to the most suitable combinations of disinfecting agencies in indigenous and imported cases.

THE plague policy of this presidency was briefly described in Part II, paragraph 3, and the sterilizing of the area of infection was included as one of the fundamental elements of that policy. In paragraph 6 of the same part, I indicated the desirability of endeavouring to ascertain exactly how the infection was spread and communicated, with a view to ascertaining how far our measures for sterilization could be considered completely adequate. Paragraphs 19 and 23 of Part III contain my conclusions as to the channels through which infection can be conveyed from the patient to the outside world.

2. Again, in paragraph 23, I sketched out our general system of disinfection and pointed out in paragraph 25 that there seemed to be a somewhat serious *lacuna* in the system, namely that it failed to provide any adequate safeguard against the possible conveyance of infection by rats, etc. How far our policy is capable of extension in this direction will be discussed in Part V and Part VII. This chapter is devoted to the discussion of the question how far our present system of disinfection can be held to do what it professes to do and whether it is capable of improvement within its own prescribed limits. I take it that the object of the system is the complete sterilization of *the house and its contents*. Limits and purposes of disinfection.

3. In Part II, paragraph 4, I indicated the lines on which I would deal with the popular attitude in regard to our various plague measures, and I now propose to fulfil this promise as regards disinfection. The chief plague measures with which I shall have to deal in this chapter are the treatment of houses, cloths and articles of furniture with boiling water or perchloride of mercury or other chemicals, the possible alternative treatment of these effects by desiccation or fire, the removal (complete or partial) of roofs and the scraping of walls and floors. Unroofing, chemicals and the treatment of cloths with boiling water are practically the only forms of disinfection in use over the bulk of the presidency: the attitude of the people in regard to these measures can be gauged with some degree of accuracy.

4. Seven years ago, the Indian Plague Commission pronounced the attitude of the people in regard to our plague measures to be one of resignation. The observation is equally applicable to the people of this presidency at the present day. They do not understand or appreciate the measures taken by the authorities (with the single exception of evacuation), and their attitude varies from one of quiet submission to one of active opposition. Positive rioting, however, is very rare. The Muhammadan community of Vániyambádi and (in a lesser degree) of Tiruppattúr have broken out in the past into open violence, and there has been a comparatively recent riot in Méttupálaiyam, mainly caused, in Mr. Brodie's opinion, by the insistance on unroofing operations: but, in the main, their disapprobation has either not been expressed at all or has found vent in harmless grumbling. Attitude of the people.

5. In parts of the districts of Salem, Bellary, Anantapur and the Nilgiris and in Vellore town and Madras city, I was informed that the more educated classes were beginning to understand and appreciate the process. Salem, Bellary and Anantapur have had a long and bitter experience of plague and in the Nilgiris, Vellore and Madras the natives will naturally come into close contact with Europeans, but there are hardly any places where they will go so far as to ask for disinfectants on their own account.

6. Mr. Rice's experience was that, before he left Mangalore, the people would vie with one another in their eagerness to obtain chemicals. The influence of personal magnetism is, however, but fleeting, when it has to act in opposition to the deeper tides of popular sentiment, and I find that the South Canara witnesses take very much the same view in regard to the popular attitude as the witnesses in other districts.

7. One or two significant facts in relation to the attitude of the more enlightened classes are worth quoting. Captain Niblock speaks of their unwarranted belief in the antiseptic nature of cow-dung. Mr. Ranganátha Mudaliyár (speaking from a very different stand-point) has confirmed this as regards Tiruppattúr. The feeling of the Guntakal witnesses was that educated Hindus only *half* believed in the process: they liked the disinfectants being sprinkled, but did not like their houses being flooded in the orthodox manner. Captain Cornwall pithily remarks that they like having their neighbours' houses disinfected, but object to their own houses being similarly treated. There is a practical unanimity of testimony to the effect that they could not, for a moment, be trusted to carry out the process themselves. The Jalarpet Station Master (the only officer who thinks to the contrary) has, I suspect, either been deceived or has generalized from a few cases of villagers who have acquired European ways of thinking from constant contact with railway officials. Dr. Lubeck (who has considerable experience of Jalarpet) takes the same view as the majority. It is abundantly clear that our disinfecting operations can only be carried out now and for a long time to come on a basis of compulsion.

Disinfection must be compulsory.

8. I find very few references to caste-scruples, and the evidence given me in Coimbatore as to the manner in which the people acquiesced in the disinfection of even the innermost shrines of their temples seemed singularly matter-of-fact. In Bellary, there were objections raised to the disinfection of the cooking-room and the "God's room": these objections had not been raised in the adjoining district of Kurnool. In some places, it was certainly urged that the process would be more popular, if the villagers were allowed to carry it out themselves—especially in North Arcot—but the reasons given were of a common-sense nature, namely their objection to having their premises invaded by outsiders and their things disarranged and damaged. When to these grievances we add the obvious hardship of having their houses left in a damp smelling condition (*vide* the Madras conference) coupled with possible roughness and extortion at the hands of the Staff or coolies, it is impossible not to understand and even to sympathise with the feelings of the people, who for the most part find no explanation for the discomforts to which they are subjected, except that it is "Sirkar Hukum."

9. It may perhaps seem surprising to some that the attitude of the people should not have been modified in the course of the last seven years by their contact with the more or less trained sanitary staff who have worked amongst them and are certainly supposed, amongst their other duties, to inculcate correct ideas among the villagers in matters of sanitation. Sanitary enthusiasm glows in the pages of the Plague Inspector's Manual (*vide* paragraphs 57, 79, 82 and *passim*) but does it glow in the breasts of those ministers of sanitation who are most in contact with the people? If this question could be answered in the affirmative, it would be difficult to explain, even allowing for the conservatism of Indian village life, why no ray of this enthusiasm has penetrated to the village and why the average villager still regards our measures with timid contempt and our agents with fear and dislike.

Quality of the disinfecting staff;

10. The general question of the plague staff will come up for discussion in part IX, but it is impossible to wholly ignore it here. We must know the materials *with* which we are performing our remedial measures as well as the materials *on* which we are working. The fact that we are dealing with a people that has to be coerced and a staff that has to be driven cannot be ignored, when the time comes for discussing what measures are practical and expedient and how such measures can be enforced. I should certainly have performed the duty entrusted to me by Government in a very indifferent manner, if I had not formed an opinion on the capacity of the staff who act as sanitary go-betweens between the people and the authorities, but I would ask that reliance be placed rather on the record of my inspections and discussions than on my conclusions. Briefly, I would sum up the

results of my own inspection and of the opinions of the officers consulted by saying that the Temporary Inspectors, as a class, are, in the language of one witness, singularly lacking in tact, conscience and intelligence. Of extortion I find little evidence, of venality little proof but too much evidence to make the fact doubtful for a moment, of indifference, idleness and stupidity proof up to the hilt. There are, of course, exceptions, but I would request that it be noted that in Coimbatore (where the views of the local officers were, on the whole, particularly favourable in regard to the subordinate sanitary staff) my own experience at Méttupálaiyam, Periyachettipálayam and Erode was distinctly unfortunate (*vide* my notes of inspection). As regards the disinfecting staff (with which I am concerned here), I find many reasons for this, the laborious and monotonous character of their work, their inferior emoluments as compared with the observation staff, the dislike with which the villagers regard them, the fact that they work amongst strangers, the fact that they have no particular status, the uncertain nature of their prospects and so forth. Their pay is high, but high pay, under such conditions as these, is hardly enough to turn out honest and efficient workers. Even amongst the Certificated Inspectors, whose status and prospects are distinctly superior, I cannot say that I came across much evidence of intelligence or industry: most of the better specimens of this class are either drafted into permanent sanitary employments or have risen to the rank of Supervisors. Supervisors are undoubtedly a decidedly superior class of men as compared with Inspectors and such is the general opinion. The temporary staff are largely used for disinfecting work (*vide* Mr. Vásudéva Rao's evidence).

11. If it be supposed that these difficulties are peculiar to this presidency or show any defects that are peculiar to our administration, such conclusions will be quickly modified by a perusal of the report of the Plague Commission (pages 370 and 371), wherein the Commissioners deal at great length with the inefficiency of the subordinate Plague Staff all over India and the inevitable scamping and slurring of work occasioned thereby. The conclusion which I draw is exactly that of the Commissioners and that of all my witnesses and their witnesses, namely the absolute necessity for efficient supervision and the extreme difficulty of getting enough of it. Mr. Noyce would like one Supervisor to nearly every Inspector. In default of sufficient supervision, the quality of our subordinate staff will, where the question is doubtful, always turn the balance in favour of the simpler method. It has been advanced, in some quarters, as an argument in favour of the abolition of all measures, especially in rural tracts. Discussion as to possible improvements in regard to the constitution of the staff must be reserved for Part IX.

12. I would gladly leave the matter at this stage, but, distasteful as it is, I am bound to justify my position in regard to the disinfecting staff by a few concrete instances. I do not enter here on the question of honesty or dishonesty: what follows is simply intended to illustrate the lack of intelligence, zeal and thoroughness in relation to quasi-scientific matters on the part of the staff. My own experience of the inability of an Inspector to understand measurements is given in Appendix IV (Periyachettipálayam notes). Mr. Fotheringham informed me that this man was one of his best disinfecting Inspectors. The conduct of the Hadagalli Inspector has already been commented on in paragraph 39 of Part III. I have a kindly feeling for Major Ffrench's Inspector, who, on seeing fleas deserting a dead rat, exclaimed "See the microbes running away", but he can have little to teach the villagers except naiveté. The Honourable Mr. Andrew tested an Inspector, to see whether he understood how to disinfect the person, with the result that the Inspector disinfected everything except the feet. Mr. Blake (Bellary) found one of the Inspectors using plain water for disinfecting purposes. I was informed of a case in which the disinfecting staff set to work to disinfect the godowns of a high officer with kerosine oil. Another Inspector (Second Bellary Conference) spoiled a disinfecting solution by mixing sulphuric acid with it. In Anantapur, we hear of a regular tariff of prices for evading disinfection. A story comes from the same district of disinfectors repeatedly leaving rags untouched in houses supposed to be completely disinfected. It is perhaps pleasing to find that Captain Niblock had a similar experience in the Punjab. The experience of an officer in Anantapur leads him to infer that the disinfecting

their want of intelligence and energy.

staff purposely scamp the operations in order to prolong the disease and thereby prolong their own appointments. I attach no special value to the inference but rather to the kind of conduct which must have induced the officer to draw it. There are one or two other instances of quaint inefficiency scattered through the notes of evidence, but enough has been said, I think, in this and the two preceding paragraphs to show the kind of subordinate staff with which we have to deal.

Method of disinfection.

13. I do not propose to enter into a detailed account or criticism of the whole method of disinfection adopted in this presidency. Colonel King's Manual contains an exhaustive account of the process. Moreover, excellent accounts of the process, as actually carried on in various parts of the presidency, will be found in Appendix VI, as, for example, those given by Major Ffrench (Hosúr) and Dr. Gibson (Madras Railway). Mr. Graham's suggestions as to disinfection derive additional value from his having had bacteriological experience in England. I will take the various subjects that seem to call for remark more or less in order of their importance, beginning with those that can be dismissed in the fewest words.

Disinfectants:—

14. The District Medical Officer, Anantapur, used sulphuric acid (1 in 50) for cess-pools and proposes to do so in Anantapur. Mr. Watkins Pitchford (a worker under M. Haffkine—*vide* G.O., No. 740 P., dated 2nd August 1898) has given the effective strength of this disinfectant as 1 in 500, and Colonel King (Plague Inspector's Manual, page 80) recommends the use of a strength of 1 in 250. Apparently, an unnecessarily strong solution has been used: otherwise, the use of sulphuric acid for the purpose indicated is in accordance with Colonel King's views and seems worthy of imitation elsewhere.

phenyl,

15. Phenyl has been tried in Bangalore and Hospet for houses but was subsequently given up. It has a limited use, as explained in pages 67 and 80 of the Plague Inspector's Manual, but is not highly thought of as a germicide. Its use for houses seems inappropriate.

carbolic acid,

16. Carbolic acid is definitely condemned by Watkins Pitchford as a germicide: he gives 1 in 50 as the minimum strength. The Plague Commission (page 356) report on it as not very powerful, and the other text-books do not mention it. Colonel King only recommends it for excreta (Plague Inspector's Manual, page 80) and even for that purpose prefers phenyl. In Madras, however, it is being used to disinfect earthen floors (1 in 20): in Anantapur, a solution of 1 in 100 is being used for the person and, in Ootacamund town, a solution of 1 in 50 is sometimes used for cloths. Authority seems to be against these practices, though the matter is perhaps not one of very great importance.

steam,

17. Steam-disinfectors have been in use in Madras and Ootacamund, and the Nilgiri authorities are greatly in favour of their use. It is suggested that portable disinfectors of the same type would be most useful in a damp climate and would restore the villager his cloth dried and ready for use on the spot. Doubtless, this would be an advantage, but I cannot think that costly and elaborate apparatus of any kind is to be commended for up-country use. This matter is further referred to in paragraph 21 below.

hydro-carbon,

18. Hydro-carbon as a germicide has been tried and found wanting by Colonel Bannerman (*vide* G.O., No. 735 P., dated 14th May 1904), and it would be presumptuous for me to say more on that point. Dr. Chenai of the Southern Mahratta Railway performed an experiment in relation to this disinfectant, which I have described in Appendix IV. Perhaps this experiment, though inferior in every other respect to Colonel Bannerman's investigations, may be held to have one advantage over them, namely that it was carried out by Dr. Chenai himself and under his own conditions. The process is undoutedly a highly dangerous one for the bye-standers, and the heat generated by the disinfectant, though intense, seems somewhat capricious and evanescent. Dr. Gibson gives it modified commendation for pucka-built houses, but pucka-built houses can be excellently dealt with by existing methods. It is the mud hut that presents the really difficult problem.

chloride of lime,

19. Chloride of lime is highly spoken of by the Indian Plague Commission (page 356), by Sir Patrick Manson (page 254) and by Mr. Watkins Pitchford (G.O. quoted above), but Major Jennings and the Commissioners finally award the palm to perchloride of mercury: they do this, however, with some hesitation and

observe that the problem of the best disinfectant has still to be worked out. It is significant that the same remark should have to be made on this subject by Major Jennings as was made by the other authority six years before. The question is a really practical one, as chloride of lime would apparently be a good deal cheaper than perchloride of mercury, but, in the face of the decisions of the two authorities quoted above, it would be out of the question for me to recommend the adoption of chloride of lime. The problem seems to press for an early and authoritative solution.

20. Izal is a disinfectant highly spoken of by Colonel Smyth and by the Kolar authorities. Messrs. Spencer & Co. have favoured me with quotations of its price and with some testimonials from professional men in its favour, all of which will be found in Appendix VII, except one testimonial by Dr. Andrew Wilson, which is too bulky for reproduction in full. I submit it separately. It appears to be cheaper than perchloride of mercury. A comparison of prices with perchloride by Colonel Smyth is appended to his evidence. As it is very soon to be tried experimentally in Bangalore (*vide* Colonel Smyth's evidence), it would be desirable that the result of the experiment be ascertained before further steps are taken in the matter. Judging by the testimonials and by the evidence of Colonel Smyth and Dr. O'Donnell, it would seem to have some strong points in its favour: it was one of the germicides tested by Mr. Pitchford, but he does not assign it a very high rank amongst them. izal;

21. I made some enquiries in the course of my tour in regard to the supply of drugs, apparatus, etc., but have received no complaints, except in regard to a few cases of delay in the past, against which the local authorities have since taken their own precautions. It would appear that the Medical Stores are now meeting the requisites of the District Officers in a prompt and satisfactory way, supplemented by the power given to Collectors of permitting the local purchase of any articles which the Medical Stores may not be able to supply. The power of prompt purchase is, of course, absolutely essential, if plague work is to be effective. There is some difference of opinion, as between the officers in different districts, in regard to the respective merits of various kinds of pumps, scrubs and brushes. Beyond observing that, for practical purposes, the ordinary Chinese pump at 6 rupees seems to be not only the cheapest but also far the most satisfactory kind, I scarcely think it necessary to offer any remarks. The matter seems to be one as to which the local authorities are the best judges. Judging by Coimbatore experience, the value of pumps is inversely proportional to their price. The views of Mr. Brodie, Mr. Spencer, Major Ffrench, Captain Anderson, Mr. Fotheringham, Mr. Noyce, Mr. Brough, Mr. Vásudéva Rao and Mr. Krishnámachári (South Canara) on the point will be found in the appendix. I may note here that, in my respectful opinion, *cheapness* and *simplicity* are an absolute *sine qua non* for all apparatus that is intended for use in the mufassal. Any apparatus that is costly, complicated or liable to get out of order if carelessly handled is perfectly useless, except in places (and there are hardly any places of the kind out of Madras City) where constant and skilled European supervision is obtainable. Coolies are almost always destructive and disinfecting Inspectors are frequently careless. I cannot help fearing that any scheme for disinfection by a flame of gas will be found to split on this rock, which seems a pity, as (if equally cheap) it would probably be preferable to the use of chemicals in some respects. It would not, of course, affect the question (to be considered later) of the desirability of unroofing houses under certain circumstances. drugs and apparatus;

22. All the authorities, without exception, speak in the highest terms of perchloride as a disinfectant. I have already discussed the relative claims of izal and chloride of lime; I know of no other chemical disinfectants, whose claims seem to merit serious consideration. The solution used all over the Presidency fluctuates between 1 in 500 and 1 in 1,000. Judging by the general trend of opinion and practice, I should be disposed to think that a strength of 1 in 500 was most suitable for mud floors and 1 in 1,000 for stone or cement floors, though the authorities give the *general* strength as 1 in 1,000. I am, of course, assuming, for the present, the *general* value of chemical disinfection, a question which will have to be more thoroughly discussed in the sequel. As regards cloths, 1 in 1,000 is the strength generally (and, I think, properly) used, but the most usual treatment is (1) burning, perchloride of mercury,

in the case of rags and grossly contaminated cloths, (2) boiling, in the case of ordinary cloths, (3) simple exposure to the sun, in the case of valuable cloths. Immersion in boiling water seems more popular than steeping in the perchloride solution: it seems equally efficient and, I think, on the whole more likely to be done conscientiously and efficiently by the disinfecting staff: it would also be cheaper. I should be inclined to recommend its universal adoption, except, of course, in big towns where the steam-disinfector is in use.

boiling water.

Fire as a disinfectant,

23. The agency of fire as a disinfectant has been already alluded to in paragraph 14 of Part I, where Sir Patrick Manson's view was quoted. The Indian Plague Commission is equally emphatic but more explicit " . . . . When the method "of *burning down* houses was resorted to, a doubt as to the complete destruction "of all the infective material cannot possibly arise. A doubt as to the completeness "of the disinfective process does, however, arise in cases where less radical methods "of disinfection by fire were brought into use." They instance kiln-burning as one of the less radical measures of the kind. Colonel King (Plague Inspector's Manual, 66) and Major Jennings (192) merely speak of the use of fire for rags and grossly contaminated cloths, an obviously essential process. I have already disposed of the question of cloths in the last paragraph. To show that the use of fire in the manner alluded to by the Commissioners is not a purely academic question, I would invite attention to a cutting from the "Lancet" of 28th May 1904, wherein are detailed the methods adopted by the Johannesburg municipal authorities on the occurrence of certain cases suspected to be plague in the cooly location. We read that the whole lines, containing 3,100 persons, were promptly evacuated and burnt to the ground. This "radical method" appears to have stamped out the disease at the outset. Again, I would instance the measures adopted by the Kolar Gold fields authorities. They are described in Appendix VI-A (notes of discussions at Kolar, Head "Removal of roof, etc.") and, for combined simplicity and efficiency, I doubt whether they could be surpassed. The burning down of every portion of the infected house which is combustible is an essential part of the process. Captain Niblock's evidence is particularly important in regard to this question. A portion of his evidence before the Plague Commission is included in his evidence in Appendix VI-A and affords a striking demonstration of the way in which an incipient epidemic was twice stamped out by burning down the infected hut and everything within it that was combustible.

when advisable.

24. In villages which are surrounded by infected villages, in villages which have been visited by indigenous plague in previous years and in villages in which a rat-epidemic has set in, the extreme measure of burning down houses would, I think, be useless: but I would respectfully submit that there seems a strong case for its adoption in the case of the poorer class of houses, when the town or village concerned is for the first time visited by imported or mildly indigenous plague. Assuredly, a treatment of the affected houses (and of the adjoining houses) after the manner described in the Kolar Conference under the head "Bratty-burning," followed by a conflagration of all the combustible materials of the huts, a rigid disinfection of all the contents in the orthodox manner (fire being resorted to in all doubtful cases) and a search for rats after the manner described in the Ootacamund notes under the head "Digging up Floors" would do all that human power can do to sterilize the infected area. Whatever be the soundest policy in regard to indigenously affected tracts, it can hardly be doubted that we should spare no trouble, energy or expense in endeavouring to protect localities that are as yet unaffected. Liberal compensation, *given at once*, would deprive these measures of a great deal of their inevitable unpopularity, and such compensation would, I submit, be money well spent. The members of the Kurnool Conference, Mr. Rice, Captain Cornwall, and (amongst non-official gentlemen) Mr. Brough, Mr. French, Dr. Gibson and Mr. Annaswámi Mudaliyár have expressed themselves in favour of the use of fire. I should have been able to get a far larger mass of opinions on the question, had I put it forward in the first instance as subject for discussion, but my first impression was that the question was out of the range of practical discussion and I did not realize its importance until I had recorded and digested Captain Niblock's evidence on the point. In any case, the method is one which, in practice, would be of use in out-lying districts rather than indigenously affected districts, so that its

applicability is to a great extent limited to districts which I have not actually visited. Its exclusion as a subject of discussion at my various conferences, though most regrettable, is in these circumstances not quite such a serious omission as might at first sight appear.

25. I must now deal with the comparative value of the various systems of dealing with infected houses which are applicable to indigenously infected localities, and first with the system of chemical disinfection now in force. That no other chemical disinfectant can at present be safely substituted for perchloride I have already endeavoured to show, but the system itself has been subjected to a rigid criticism at the hands of all the officers consulted. I think I may express the conclusion of the majority in these words: so far as the better class of houses with cement floors and walls is concerned, the disinfection (apart of course from the treatment of the roof) may be accepted as theoretically and practically perfect: as regards the poorer type of house, with chinks, crannies and interstices in the walls' and floor, made of mud and with coatings of dirt, grease and cow-dung, the disinfection cannot be considered *theoretically* perfect. Whether in this latter case it is *practically* sufficient to serve the required purpose is a subject on which various officers hold different opinions. The scientific questions at issue are really those raised in paragraphs 31 and 48 of Part III. They are questions which can only be settled by the bacteriologists. The practical question at issue is whether infection still lingers in a house after chemical treatment. This can neither be proved nor disproved conclusively. The non-occurrence of recrudescence is not proof positive that the germs were destroyed by the chemical process. Mere lapse of time may have produced the effect and the non-recrudescence in the meanwhile may be simply good fortune. On the other hand, an outbreak in the same house need not be due to the germs having survived the disinfecting process: it may be due to re-infection by rats or from some other external source. It is, in fact, impossible to solve either the problem now before us or the problem of recrudescence, house by house and in detail, on epidemiological lines. My conclusion as regards recrudescence was (Part III, paragraph 46) that it is a factor which had considerable influence in determining the yearly succession of epidemics, whilst on the other hand it seemed equally clear (part III, paragraph 45) that there was some force at work which tended to weaken the process of recrudescence in such a way as to seem to deprive it of all initiative, if the matter were looked at superficially. It does not seem unreasonable to assume that this checking or restraining force on recrudescence consists, in part at any rate, of our present system of disinfection, and that, if the disinfecting process were made more perfect, the checking action would become more effectual. Personally, I am inclined to think that, within its own limits, chemical disinfection is practically always an effective process, if properly done. The evidence of Mr. Spencer and Major Ffrench that return to *badly disinfected* villages was followed by recrudescence seems to me particularly significant in this connection. The case of re-infection in Katganahalli, Mysore district, quoted by Mr. Krishnaswámi Aiyar (Appendix VI-C) also deserves attention. It is either a case of recrudescence following on failure in the matter of disinfection or a most extraordinary coincidence. The great defects in the process are, I think, in the first place, that an untrustworthy disinfecting staff has to carry it out, and that frequently without proper supervision, in the second place, that rats and other vermin may at any time re-infect the house and thus render the work nugatory and, in the third place, that the roof and the rat-holes are not as a rule sufficiently attended to. These three defects seem to me to be sufficient to account for such a degree of persistent soil-infection as is necessary to explain the yearly succession of epidemics in this presidency.

Practical value of chemical disinfection; its defects.

26. It may be observed further that *gross* contamination of the floor or walls, though it would doubtless neutralize the disinfecting solution, would probably have previously destroyed the bacillus: on the other hand, a floor almost completely destitute of organic matter would afford the bacillus scanty nutriment and would give the disinfecting solution a very good chance of acting: it will, therefore, be on floors (or parts of floors) occupying an intermediate position between these two extremes that the bacillus may be expected to survive the solution, if it survives it at all. This consideration seems to suggest that there are considerable obstacles in the way of the bacillus surviving the disinfecting process in many instances.

27. I freely admit that I have a large body of opinion against me, when I claim that disinfection is of some practical value in the huts of the poor. Captain Niblock and Dr. Elliott both aver, partly on scientific grounds and partly on the strength of their experience in the North of India, that the process is useless or nearly so in the case of the poorer type of houses. Captain Gordon Tucker is, if possible, more energetically of opinion that it is ineffectual. The President of the Plague Commission minuted strongly against it and the remaining members of the Commission gave it a somewhat half-hearted support. Dr. Marsh's experiments (conducted apparently on the assumption that the solution would have to pass through a considerable amount of cow-dung before reaching any bacilli at all) gave the startling result that 1 in 75 (instead of 1 in 1,000) was the strength of the perchloride required for effective sterilization of a floor. The Commission, however, disagree with the results and dispute the validity of the method adopted (Indian Plague Commission's Report, V, 357–9, 375—6, 508—9). I freely admit that there are numerous arguments of a theoretical nature which may be and have been urged against the process: the action of the perchloride on organic substances is to coagulate the albumen: this may form a protective sheath to the bacillus: the grease on the walls and the spongy mud on the floor may absorb and neutralize the chemical or prevent its reaching the bacillus and it may be that the precautions suggested by the Government of India against these contingencies (*vide* G.O., No. 1549/P., dated 9th December 1898, and G.O., No. 1154/P., dated 27th July 1899) are theoretically insufficient: the germs may all remain undestroyed in chinks and crevices of the walls and floors which it is difficult for the disinfecting solution to reach: but what these objections amount to *in practice* none of us are in a position to say. As regards conclusions drawn from re-infection arising in disinfected houses, I will venture to say that one or other of the three defects to which I have alluded at the end of paragraph 25 existed in Poona, Bombay and Karáchi, just as much as they exist in this Presidency. Whether they are sufficient by themselves, as I think, to explain such recrudescence as occurs or whether it is necessary also to assume the practical inefficiency of our system of disinfection are questions which we have no means of deciding authoritatively at present. I admit that the arguments in paragraphs 25 and 26 are very weak, but I submit them, because they have convinced me and I can find no better ones on either side of the question. They are entirely based on the assumption that recrudescence is a factor in the ætiology of plague. Those who disbelieve in recrudescence can hardly fail, as a rule, to regard chemical disinfection as a waste of time, money and energy. Why slay the slain? Captain Gabbett, however, draws the precisely opposite conclusion to mine on this point.

Unroofing of houses,

28. I now come to the question of unroofing. The Indian Plague Commission observes that "where a house is completely unroofed . . . . we have reason "to suppose that the germs of infection would probably all be destroyed within a "comparatively few days": as regards the practice of making small holes in the roof or removing some of the tiles, they remark that "in such a case no dependence "could be placed upon the disinfecting action of direct sunlight, and . . . . "there is no evidence to show that diffused day-light has any influence upon the "vitality of the plague bacillus" (Indian Plague Commission's Report, V, 371–2). In their recommendations, however, they observe that complete unroofing is a "needlessly drastic measure for effecting an object which could be brought about "by chemical disinfection more expeditiously": nor do they consider it necessary that chemical disinfection should be applied to the roofs, for they say that, though "in exceptional instances infective material may have been deposited by rats in the "roof . . . . especially in the mud roofs of village houses, ... the "devitalization of such infective material, deposited as it is in places which are not "readily accessible to man, might quite safely be left to the action of desiccation." My evidence certainly shows that the presence of rats, squirrels, mice, bandicoots and vermin of all sorts in the roofs of houses is the rule rather than the exception: this holds good of mud and thatched roofs and (in a slightly lesser degree) of tiled roofs. I doubt, therefore, whether we should be justified in considering that the instances in which infective material is deposited in ceilings are exceptional, so far as this Presidency is concerned. That the infective material is "not

"readily accessible to man" again is a generalization that hardly applies to many parts of this presidency (Hosúr, for example), where the lofts are used by the house-owners as a general store or lumber-room and would therefore be in fairly frequent use. Lastly, it is clear that the same agency which carries infection to the roof can redeposit it in other places which are accessible to man. A few notes on the same subject (though in a different connection) will be found in paragraph 30 of Part V. I, therefore, submit that the unroofing of houses, though it may be drastic, is not from the sanitary point of view needless, chemical disinfection being, according to the general consensus of opinion of the officers examined, insufficient so far as the roof is concerned. It would be premature to discuss the evidence in detail, but Mr. Krishnamáchári's accounts of his experience in Mangalore are striking and conclusive.

29. Most of the witnesses consider the complete unroofing of houses impracticable, partly on account of the unpopularity of the step and partly on account of the expense involved (1) in carrying out the process, (2) in compensating the owners. I fear that, where the operation would have to be carried out on a large scale or where we are dealing with mud roofs of the type which is universal in the Ceded Districts, the expense and trouble would be considerable. I must, however, submit on this point that, according to my view, the operation of *complete* unroofing is an essential complement of chemical disinfection, if the process is to be considered thorough, and I think that it could be carried out with special advantage in the early stages of the indigenous infection of a town or village for the first time; it has the double advantage of destroying infection which cannot be properly or completely reached by the process of chemical disinfection and of exposing the interior of the house as a whole to the action of direct sunlight; the Plague Commission draw attention to the second point, in the first passage quoted above. I cannot think that the unpopularity would be so great as to render the measure impracticable: I have only heard of one case in recent years in which the measure was supposed to have brought about a riot. That compensation should be given *promptly* and on a liberal scale is, I think, an essential. The burning of the roof "*in situ*", when it consists of inflammable materials, seems the best method of all. This is practically the method discussed in paragraph 24 above. where practicable.

30. In cases where the magnitude of the operation would entail an impracticable amount of labour and expense, Captain Gabbett's suggestion seems a sound one, namely that unroofing should be resorted to, where there is some evidence that the house is rat-infected: if to houses of this category be added the class of houses and buildings in which rats are most likely to congregate, *e.g.*, grain and food shops, it may perhaps be presumed that the majority of centres of infection will have been secured: on the other hand, the remainder of the buildings, which have been treated chemically, will not get the benefit of the powerful disinfecting action of the sun's direct rays. I may note that none of these remarks are intended to apply to permanent roofs properly cemented into which rats cannot penetrate. Houses that approach the type of an European bungalow can, as a rule, be perfectly adequately treated by chemical disinfection, and the absence of mud and organic material would, in any case, presumably prevent them from remaining centres of infection for any length of time.

31. Complete unroofing on anything like a large scale has been mostly confined to the Salem district and it may be, as noted above, that the complete unroofing of the flat roofs of the Ceded Districts would in practice involve too much trouble and expense to be practicable. Partial unroofing has, however, been widely practised. Most of the officers consulted by me admit that partial unroofing cannot effectively get rid of rats, vermin or possibly infected material, but the object assigned for the practice is the admission of ventilation and light into the building. I confess that to me, as to the majority of the Commissioners, this practice seems a waste of time and money and a cause of needless annoyance to the house-owner. Diffused day-light is admittedly inoperative as regards the bacillus: doubtless, there is a suggestion that ventilation will tend to desiccation and may in that way effect the destruction of the germ. Sir Thomas Fraser is strongly in favour of the measure, partly on this ground but partly with a view to the improvement of the general Partial unroofing of little value.

in-door sanitation of the natives of India (Indian Plague Commission's Report, V, 507-9: compare pages 482–492 *passim*): with all deference, I submit that a plague germ, which is so firmly imbedded in a mud and cow-dung floor as to resist the action of floods of perchloride of mercury, will assuredly be unaffected by such mild currents of air as may be wafted about the upper parts of the room by the opening of a hole in the ceiling or wall. That such a current of air would ever reach the floor or the lower part of the walls at all seems unlikely: that it would completely desiccate a germ imbedded in floor which was so foul and porous as to protect the germ from the action of the disinfecting solution seems almost impossible. Considered, therefore, as a supplement to imperfect chemical disinfection, the measure seems useless.

32. Doubtless, according to European ideas, the partial opening out of the house is an improvement, in so far as it tends to let light and air into the dwelling: but I apprehend that the money now spent on plague operations is being spent with the direct object of destroying infection and not with the object of imparting ideas of general sanitation to the native population at large (a matter on which I submitted my views in Part III, paragraphs 51 and 52). The evidence before the Plague Commission showed that all attempts made in the past in the direction of improving the ventilation of native houses were frustrated by the house-owners, who closed up the openings made in their houses at the earliest opportunity. In any case, if anything in the nature of an object-lesson in general sanitation were intended, holes in the wall would apparently serve the purpose better than holes in the roof.

Mysore method of burning bratties;

33. I have now shown some reasons for supposing that, in the case of the better class of houses, chemical disinfection is a thoroughly efficient means of sterilization and that, in the poorer class of houses, it may be considered practically efficient, when coupled with complete unroofing. I have endeavoured to show that, in all but the best kind of native houses, fire is the really efficient means of sterilizing germs. A method much in favour in the neighbouring State of Mysore is the method of burning bratties, (*i.e.*, dried cow-dung cakes). The notes of Dr. Palpu's evidence, coupled with various sets of rules printed in Appendix VII, sufficiently indicate the details of the process. In discussing this method, it is important to see exactly what is claimed for it, as compared with the systems in force in this presidency. I think that its advocates would claim that its germicidal effect in regard to the interior of houses is about the same as or perhaps slightly better than that of a combined system of chemical disinfection and unroofing, while certain collateral advantages are claimed for it which will be discussed in detail. It would hardly be contended that it has the same sterilizing effect as combustion of the whole house and, like all the other systems of disinfection discussed in the present chapter, it offers no guarantee against the re-infection of the house by rats or other vermin.

34. By the courtesy of the Mysore Government, I was enabled to visit Bangalore and Kolar officially and was given all possible facilities for prosecuting enquiries in regard to the systems of disinfection in vogue. Colonel Smyth and Dr. Palpu kindly gave me the opportunity of witnessing an experiment in bratty-burning. Through Dr. O'Donnell's kindness, I was enabled to get an adequate idea of the way in which the Gold Field Authorities deal with plague. The system seemed to me perfect, but the conditions are exceptional; the system is not only worked *by* Europeans but also *for* Europeans, the natives of the Gold Fields being, for the most part, followers of and dependants on the European community. Further, the European community are willing and able to pay large sums to secure effective arrangements and adequate European and Eurasian supervision. In addition to these advantages, it has to be remembered that the Plague operations are under the supervision of a Medical officer of exceptional zeal and capacity, who has been in medical charge of the Gold Fields for 18 years, and the area to be protected is sufficiently small (about 14 miles round) to enable one man to keep his eye on every detail in the course of his daily work. The conditions of work in an ordinary infected area in this presidency are widely different, and inevitable differences in practice are the result. Nothing, for example, can be more admirable than the

separation of the huts, illustrated by a rough diagram in the notes of Dr. O'Donnell's evidence, but the method is most unfortunately inapplicable to this presidency. Dr. Elliott (Kolar) showed me under the microscope the only plague bacillus which it has ever been my privilege to see and also favoured me with some stimulating criticisms, by which I have done my best to profit.

35. Coming to the question immediately before me, namely, the efficiency of bratty-burning as a sterilizer, I find that opinion and practice within the Mysore limits differ materially on the subject. On the Gold Fields, bratties are used for sterilizing grain but not for ordinary house disinfection. Captain Standage, whose work lies in the Civil and Military Station, Bangalore, is definitely in favour of chemical disinfection as opposed to the use of bratties, though he has naturally had exceptional opportunities of seeing the working of the latter system close at hand. Mr. Krishnaswámi Aiyar (a Civil Surgeon in the service of the Mysore Government, who has had considerable experience in the Kolar district and earned the gratitude of the Mining community) thinks that bratties are of use in combination with chemicals, but considers that "they have a very limited application as a disinfect-"ant." It is also evident from Mr. Krishnaswámi Aiyar's evidence that chemicals as well as bratties are used in rural tracts in Mysore State. Colonel Smyth, as already noted, is going to try izal as a disinfectant and has used it in his own house. Colonel Benson, I.M.S. (late Sanitary Commissioner, Mysore), to whom I am under the greatest obligations for advice and assistance, and Dr. Palpu (Health Officer, Bangalore City) are more unreservedly in favour of the system of bratty-burning, though they are convinced of the advantages of chemical disinfection in the case of cement and stone floors. I may at once say that the method seems to have a number of very strong points in its favour. In the review which follows, I will try to do all possible justice to them, though I am compelled, at the same time, to bring to notice certain considerations, which seem to me to militate against the introduction of the system into this presidency on a large scale.

Its efficiency as a sterilizer.

Opinion of Mysore authorities.

36. All the officers named above, with the exception of Captain Standage, are more or less strongly opposed to the system of disinfection by perchloride of mercury, as practised in this presidency. The theoretical objections have been detailed and discussed in paragraph 27 above. Colonel Smyth sums up the case against chemical disinfection in the pithy remark "what good is gained by destroy-"ing 3 bacilli out of 4?" I think that this comment might be applied to both methods of disinfection with some force. The experiments conducted by the well-known bacteriologist, Dr. Srínivása Rao, on the merits of bratty-burning as a germicide have been kindly communicated to me by Colonel Benson. They are embodied in Proceedings No. 15,251-2/L.B.P. 741 of the Government of Mysore, dated 22nd April 1903, and are printed in appendix VII of this report. Here we have a series of experiments, in which dishes, tubes, etc., containing cultures of the bacillus, are exposed to the action of the bratty-burning process. Let me take each dish or tube as if it were a bacillus. Experiment No. I, destroys 11 bacilli out of 12; experiment No. II destroys 7 out of 8, experiment No. III, 4 of out of 8 and so forth. Colonel Benson remarks that "Whether it", *i.e.*, the method now under discussion "is more efficient than disinfection by chemicals it is extremely "difficult to say. There is no proof that disinfection by means of chemicals renders "a house *sterile*. In the same manner, there is no proof that disinfection by "desiccation does." It would seem, therefore, that there is little or nothing to choose between the methods on purely theoretical grounds. I proceed to discuss the collateral points on which a comparison can be made between the two methods.

37. Superiority is claimed, and I think justly claimed, for the method of desiccation on the ground that it permeates the *whole* interior of the house and affects the roof in particular; "fleas, bugs, etc., are killed and rats are either stifled or "driven away." In fact, the heat in the upper part of the room is greater than the heat near the floor, and I am certainly of opinion that, in any but very thick and solid roofs, the process would have all the effect of unroofing as a germicide and insecticide. Natives are themselves in the habit of burning bratties, straw, sulphur, etc., with the object of ridding their houses of fleas, mosquitoes and so forth. There is, of course, the risk of the roof catching fire. Judging by Dr. Palpu's evidence, the risk is not very great, nor could I regard the destruction of an

Wherein desiccation is superior to disinfection.

occasional roof as an unmixed evil, but I think that precautions would always have to be taken to prevent the possibility of a large and spreading conflagration—especially in the dry weather. The burning down of half a village or of one side of a street in a town would be a very serious affair, and it cannot be said that such a contingency is impossible with careless disinfectors in charge of the work.

Its defects.

38. There is undoubtedly a considerable advantage in a process which permeates a whole house from roof to floor, but I have to note a serious set-off to this advantage, namely that the method is admittedly unsuitable for verandahs and for rooms that cannot be adequately closed. Colonel Smyth notices this disadvantage and Mr. Krishnaswámi Aiyar emphasizes it. There are, in fact, very few houses that could be *completely* disinfected by desiccation: there are, in most houses, dark but open court-yards, rooms with open spaces which would have to be artificially closed, verandahs, pials and so forth. These would have to be treated with perchloride of mercury or some other chemical in the orthodox way. It may be, however, that, in the Ceded Districts, where the houses are mostly very dark and capable of being securely closed, this objection would be of less weight.

Bratty-burning unsuitable for pucka-built houses;

39. In any case, all are agreed that, for the pucka-built house with cement or stone floors, bratty-burning is unsuitable. Cement floors are spoilt and Cuddapah slabs are cracked. For such houses, chemical disinfection is admittedly effective. Further, Dr. Palpu's evidence shows that cloths, when left in the house during the process, are discoloured, so that this is no longer done in practice. Boiling water or a solution of perchloride would still, therefore, be necessary for them. I see no reason why furniture should not be left in the house, precautions being taken, of course, against its being burnt. The matter, therefore, stands thus: are we to have a system which combines chemicals with unroofing, or one which combines chemicals with bratty-burning? Either method would, in my opinion, secure practical (not theoretical) efficiency within more or less the same limits.

its cost;

40. Cheapness is strongly and justly claimed as a feature of the Mysore method. In the experiment performed in my presence, a cart-load of bratties (at the price of 2 rupees) sufficed to treat a house of six rooms. The matter is worked out in Captain Standage's letter on the subject (printed in Appendix VII), and he does not dispute that the cost of chemical disinfection is decidedly greater. I have not myself gone into this question of cost in any great detail for reasons which I will now submit: at present, the bratty-burning operations are confined for the most part to Mysore and Bangalore and, even in those cities, they are of comparatively limited application, the disinfection of a house being in Mysore State entirely at the option of the house-owner. While the work is carried out on a comparatively small scale, it is to be expected that Mysore State should have a sufficient number of surplus bratties to place at the disposal of the disinfectors of its two chief cities at low rates and without inconvenience.

difficulties in the extensive application of the method;

41. Let us, however, suppose that, in one of our infected districts, Bellary for example, the method of bratties were brought into force. In this presidency, disinfection is compulsory and is carried on on a large scale, and the demand for bratties would be enormous. Who would undertake to prophesy what would be the exact effect on their price? That it must go up largely is all that we are in a position to say. In this place, I would request that an extract from Dr. Voelcker's book on agriculture (brought to my notice by Mr. Carr) be taken into consideration (Improvement of Indian Agriculture, Ch. 7, "Manure," printed in Appendix V). In this book, Dr. Voelcker complains that the practice of using bratties for fuel and for the burning of corpses has the prejudicial effect of burning up the manure of the country. It is noticeable that on the Nilgiris (*vide* the Ootacamund Conference) bratties are too valuable to be used as fuel, being reserved for what Dr. Voelcker would consider their legitimate purpose: but what would Dr. Voelcker say and what will the ryot say, if a sudden demand for bratties diverts them alike from the purpose for which the ryot *does* use them and from that for which, from an agricultural point of view, he *should* use them?

42. I am inclined, however, to think that matters would not, in practice, be likely to come to this pass. There is an almost universal apprehension amongst

the officers in this presidency whom I have consulted (and the subject of bratty-burning has taken a prominent place in all my conferences) that the problem would present itself in the form of a more or less speedy cessation of the supply of bratties and the consequent break-down of the system. Perhaps, the observations of the witnesses examined at Guntakal and Anantapur have most significance in this connection. Experiments in desiccation were actually tried in that district under Dr. Chalke's auspices, and the Tahsildar of Gooty expatiates on the difficulty with which he got the ryots to procure bratties for the comparatively limited number of houses disinfected by this method. While, therefore, I freely admit that, taking prices as they stand now, the method of burning bratties and treating verandahs, etc., with chemicals would be decidedly cheaper than the method of combined unroofing and chemical disinfection now in practice, I could not for a moment undertake to say that the rate for bratties would keep down at its present figure for any great length of time after the system had been brought into general use, and I submit for consideration the question how far we should be justified, unless the advantages were great and unquestionable, in out-bidding the villagers for what may be considered a necessity of life to them under present conditions. Colonel Smyth was of opinion that there was some weight in this objection, though it had not assumed a practical aspect as far as Mysore was concerned, and he gave me an instance of a planter who had been unable to adopt the process because bratties were not to be had.

43. Even when the problem is put in this way, it does not perhaps put the case as fully as it may be put in favour of chemicals. So far as bratties are concerned, everything would tend to a rise of prices without any counteracting influences that I know or have been told of: but it is claimed both for izal and chloride of lime that they are cheaper than perchloride of mercury and equally effective and, as I have endeavoured to show in paragraphs 19 and 20, these questions still await decision. In other words, while the price of bratties must inevitably go up, if their use is freely resorted to, there is no reason to suppose that the price of chemical disinfection will go up in the future and it is quite possible that it may go down. This argument does not of course affect the question of the use of bratties on a small scale or in special circumstances. How far this would be practicable or advisable will be considered later on.

44. Theoretical objections have been raised in some quarters to the process, for example; that the heat would be wasted in drying up damp floors, that the heat would tend to rise and would not affect the floor, that it would not penetrate below the surface of the floor, that it would be unequally distributed and so forth. These objections may perhaps be set off against the theoretical objections raised in regard to chemical disinfection. A practical objection was raised in Hospet, namely the difficulty of storing bratties in rainy weather. This is an important point, as Colonel Smyth insists on the necessity for using the bratties *dry*, if a good result is to be obtained. The storing of large quantities of bratties would not be an easy matter, nor would there be any very satisfactory method that I can see of gauging the exact number that would be required. In Bangalore, they were supplied on contract, and I imagine that a similar method of obtaining them would have to be employed in this presidency, if operations had to be conducted on a large scale. An objection raised in Anantapur was that the Disinfecting Staff (especially the coolies) would steal the bratties, unless they were carefully watched : Colonel Symth, on the other hand, suggests that the chemical disinfectants are frequently stolen under our present system, as they will always possess a marketable value. There seems to be considerable force in both arguments.

difficulty of storage;

45. The method of desiccation is perhaps favoured by the Mysore authorities as much on account of its popularity as on account of any other consideration. If I cannot bring myself to attribute quite as much weight to this consideration as these high authorities, this may, after all, be a defect in my own character : in any case, I fully realize that "caeteris paribus" popularity is an important point. The Mysore method of leaving the house-owner free to choose what disinfectant he will have, if any, coupled with the fact that, in Bangalore city at any rate, his choice mainly lies in the direction of bratties is undoubtedly an indication of popular

argument from popular preference for the method;

feeling in favour of bratties which we cannot parallel in the Madras Presidency, where the ryot is given no choice in the matter. It has, however, to be noted that those residents of Bangalore, who have sufficient enlightenment to desire that their houses should be disinfected at all, would probably also have sufficient common sense to consult the authorities or at least ascertain their views, before making a decision as to the form of disinfectant to be used. They would therefore in many cases be swayed (and very rightly so) by the advice of the authorities rather than by their own first impulses; moreover, they will probably represent the more intelligent portion of the community, rather than the average house-owner: if *some form* of disinfectant were compulsory on every house-owner without exception, nothing but the choice of the disinfectant being left to him, the form chosen would of course be an absolutely conclusive expression of the popular will: however, even with this reservation, I feel very little doubt that the facts do show a decided preference for bratties in Bangalore and Mysore cities. Most of the officers consulted in the Madras Presidency moreover consider that the people in this presidency would prefer the process of desiccation to the process of chemical disinfection. They base their conclusions on the fact that people even now use bratties for fire and (occasionally) as an insecticide and would therefore to some extent understand and appreciate their value as disinfectants, on the consideration that people like something which appeals to their senses (a characteristic which bratties possess in a greater degree than chemicals) and lastly on the fact that the process of bratty-burning would leave their houses dry and ready for re-occupation, whilst the process of chemical disinfection leaves the house damp and smelling. It is, however, significant that, in the only district in which the operation has been performed on anything approaching a large scale in something like the Mysore method, namely the Anantapur district, opinion was much divided on this question of popularity. The evidence of the Anantapur witnesses was obtained partly at Anantapur and partly at Guntakal, and the opinion of the gentlemen examined at these two places differed widely in regard to the question whether the method was or was not likely to be more popular than the method now in force. The Tahsildar of Gooty was very strongly of the negative opinion.

46. That the house is left in a very unpleasant state by the use of chemical disinfectants there is no doubt, but, as disinfection on a large scale is and should be coupled with evacuation as a rule, there would frequently be no occasion for its immediate re-occupation: this consideration might have more weight in big towns where the remedial methods adopted included disinfection but not evacuation. Personally, I would submit with all deference that, where evacaution is impossible, disinfection is useless or nearly so: the opportunities for re-infection are too numerous. The Wellington case quoted by Captain Gabbett (Ootacamund Conference) and Captain Standage's Bangalore experience (*vide* the head "disinfection") seem to support my position in this matter. I may add that a counter-objection was raised against bratty-burning in Kistna, namely that the smoke discoloured the houses (evidence of Mr. Krishnamáchári, now a Deputy Collector in South Canara). Dr. Palpu notices this as regards cloths, and that the experiment results in the formation of thick black smoke is emphasized by the authorities and was seen by me personally. Captain Standage notes that the smoke is a nuisance to the neighbours.

Inadvisability of altering the existing practice.

47. It is fairly certain that, if it were a question of commencing once for all with one of the two methods, the method of bratty-burning would be decidedly more popular, but I suspect that the feeling produced on the average villager by a change at this stage would be one of bewilderment rather than relief or pleasure. The essentially conservative character of the Hindu extends to every detail of his life, and there is hardly a Plague measure to which he does not become more or less reconciled in the course of years. Expressions such as "they objected to it at "first, but now they have become used to it" are to be found at every stage of my evidence, "it" being any measure that may happen to be under discussion. Chemical disinfection is no exception to this rule. The people, as Mr. Wait puts it, have got to regard chemical disinfection in Adóni as something in the nature of a religious rite. To regard a thing as fixed and to regard it as desirable are not altogether dissimilar mental attitudes, and I think that the prejudice with which the

villager regards any form of change whatever would be something of a set off against his comparative familiarity in other connections with the process substituted. I cannot refrain from adding that any material change in our Plague policy would, for obvious reasons, tend to produce some feeling of distrust in the minds of educated and uneducated alike, except of course the comparatively small number who were able and willing to weigh and appreciate the reasons which led to the change: this is no reason for continuing a policy which is clearly shown to be comparatively ineffectual in favour of one which has obvious and undoubted superiority: but, where the merits of two policies are nearly equal and neither policy advances a claim to theoretical perfection, the consideration just submitted may suffice to turn the balance against change. Another consideration which makes me hesitate to recommend experiments in this direction (at any rate in indigenously affected tracts) is that I feel very doubtful whether our disinfecting staff possess much more flexibility of character than the villagers themselves: they have got used to one system of disinfection, and it will certainly be a matter of time and trouble to get them equally used to another.

48. When we consider the use of bratty-burning, coupled with such modifications and additions as Dr. Elliott and Mr. Krishnaswámi Aiyar advocate, namely the scraping of walls and floors, the burning of bratties mixed with the scrapings, the subsequent treatment of the floor and scrapings chemically and (I would suggest, in addition) the digging up of rat-holes and the destruction of the combustible materials of the house by fire, we have a method which, from the scientific point of view, seems absolutely unexceptionable, though it at once loses the elements of cheapness, popularity and familiarity. Whatever be the theories of infection which may finally obtain authoritative acceptance, such a method as that just described must, I think, result in the absolute destruction of every possible source of infection in the area so treated. Considered from this point of view, bratty-burning may be regarded as a valuable *supplement* to chemical disinfection in the limited number of cases in which efficiency has to be obtained at all costs. I would respectfully recommend this method in the areas in which plague has obtained no foot-hold, that is to say, in districts which have not been infected or in separable portions of districts which may be considered uninfected. What can be considered an uninfected *portion* of a district is a question on which no rules can be laid down: the southern portion of the Salem district could well have been separated off as an uninfected portion two months ago: the eastern portion of the Coimbatore district (Erode, Satyámangalam and Bhavani taluks) is similarly separable. In any case, in such districts and portions of districts, I submit that no pains or expense should be spared to keep the disease from getting a foot-hold, and the combined influences of fire, desiccation and chemicals which I have suggested above (coupled with the digging up of any rat-holes found on the premises) would, if applied to the infected houses and the adjoining houses, do all that can be done to dam up the source of infection. I have already adverted to this point in paragraphs 24 and 29 above, and I trust that I may be pardoned for recurring to it on account of the importance which is universally attached to the effectual treatment of "first cases": after a place has to be pronounced indigenously affected or, in other words, after a rat epidemic has started, the methods of evacuation, chemical disinfection and unroofing (within the limits laid down in paragraphs 28 to 32 above) would seem to be the most that our resources permit of. Considering that the necessity for the digging up of floors is not *proved* (Part III, paragraph 48), I cannot venture in the present state of our knowledge to recommend its general acceptance, where it is a question of dealing with whole villages or towns, as the increase in trouble and expense would be very formidable, but there seems to be a strong enough case to justify its adoption in imported and early indigenous cases in the manner indicated above.

Conclusion as to the most effective method of disinfection.

PART V.

RATS.

Recrudescence and the action of human beings not sufficient to account for the epidemic character of plague: no other cause but the action of rats seems predicable—Characteristics of epizoötics—Plague amongst mice, squirrels, cats, monkeys, dogs, the domestic animals, fleas, bugs, lice, snakes, flies—The rat-flea theory: means by which human beings can be inoculated with plague—Actions of animals, birds and the wind as conveyers of infection—Manson on rats—Opinion and practice in other countries contrasted with opinion and practice in India—Should adverse presumptions be raised in regard to evidence of infectivity of rats and grain?—Discussions of the evidence of the action of rats in spreading infection from village to village—Opinion of experts and evidence (bacteriological and epidemiological) regarding the infectivity of grain—Evidence as to the action of rats in spreading infection within villages and towns—Attitude of the people—The destruction of rats considered to be the only direct means of depriving plague of its epidemic character.

IN paragraph 23 of Part III, I enunciated the results which seemed to follow from the earlier part of the chapter in regard to the first stage of the process by which infection was conveyed from the body of the patient to the outside world. In the latter part of the same chapter, an attempt was made to trace the history of the bacillus, in so far as it inhered in inanimate objects, the soil and clothes being taken as typical. I indicated, in paragraphs 24–28, that there was another possible cycle in the life of the bacillus between its exit from the body of one patient and its entrance into the body of another patient, namely that in which its intermediate history consisted wholly or in part of a passage through the body of the rat or of any other animal capable of receiving and transmitting infection. The facts sufficiently testify to the practical importance of this cycle of infection as a feature of the history of plague, but I may note here that in practice it is rendered possible (1) by the existence of an interval between the infection of the house and the process of disinfection, (2) by any defects that may have been found to exist in the disinfecting process itself (*vide* Part IV *passim*). I also indicated (paragraph 27) that the exact manner in which entrance was finally effected into the human organism was to some extent a matter of controversy: a breach of continuity of the skin is no doubt essential (except in rare cases), but there has been much discussion as to how the abrasion of the skin is effected and how the virus is introduced. This matter can only be adequately discussed in connection with the present chapter.

Methods of conveyance of infection.

2. It will be further observed that the questions discussed in the last two chapters deal entirely with the inherence of infection in certain media, but do not (except occasionally and parenthetically) touch on the question of its conveyance from place to place. If, as I believe, the discussion as to soil-infection has been practically complete and exhaustive, in the sense that it has *touched on* every aspect of the question that has any importance, a very important practical conclusion at once follows, namely that soil-infection, considered by itself, cannot account in any way for the *spread* of plague and therefore cannot provide any explanation of the most characteristic and formidable peculiarity of the disease, namely its epidemic character. One or two writers on plague are disposed to find in the sanitary features of towns, sub-soil drainage and the like an explanation of the spread of plague. I cannot, however, find any evidence whatever in favour of this hypothesis, which is (so far as I have seen) only supported by arguments of a highly speculative nature and has no support which I could consider as authoritative. To attack such a theory is like beating the air. The possibility of infection being conveyed, in very exceptional cases, by mechanical agencies, such as the wind or the force of gravitation, from one house to another house cannot be denied, but whoever wishes to convince sanitarians that such a means of transference is of any practical importance must, I think, produce more solid and tangible evidence in support of his assertions.

Rats as a medium of infection.

3. Rats and the allied species, therefore, stand in an unique position in regard to infection: the soil can retain the infection: man can convey it from place to place through the medium of cloths, etc., but the community of rats can operate in both ways: they can (as a community) keep the infection alive and at the same time

transmit it from place to place: the extent of their influence in this direction is the main subject-matter of the present chapter. I may note that, except when the context shows the contrary, the word "rats" will be used, up to the end of paragraph 10 of this chapter, as including other similar quadrupeds. A few notes on the infectivity of other animals will be appended in due course.

4. This is, perhaps, the best place in which to touch on the agency of man as a disseminator of infection: for, when the agency of man and the soil is exhausted, no agency of which I am aware remains, except that of rats and the allied species. In the discussion of a question of extreme complexity, the best method is to *abstract* the various causes, in so far as this course is possible. Let me suppose, for argument's sake, that *rats* do *not* act as conveyers of infection and that infection does *not* adhere in the soil for any length of time, and let me consider the probable results of the state of things described in the first portion of paragraph 23, Part III. In paragraph 22, I gave some reasons for supposing that the action of human agency in the spread of infection would be trifling, but the matter has been too summarily dealt with, considering its vital importance. **Man as a disseminator of infection.**

5. In that paragraph, I put forward the view that the fear and suspicion of friends and neighbours would be aroused by an illness, which must *ex hypothesi* be attended by suspicious circumstances: for how, in a supposed absence of the rat element of infection, could any person catch the disease, except by coming from an infected locality or by close intimacy with some person who had come from such a locality? We are apt to conclude that the attitude adopted by the people towards our sanitary precautions indicates complete indifference to the disease and is simply due to carelessness on their part. Nothing can be further from the truth. Contagion means for the people the horror of the disease with the added horror (let us say) of an onslaught by the sanitary staff. I had personal experience (as Sub-Collector in Chingleput) of a few cases of imported plague: in one of these, the patient (a woman from the Ceded Districts) arrived at dusk at Conjeeveram, was turned out of the house by her relations, wandered homeless over the town and was finally housed for the night *in the garden* of a female quack-doctor: the authorities received speedy information of these facts from the neighbours, who then shut up their shops and fled. This, be it remembered, took place in a typically Hindu town and one which had never known the horrors of plague, except by distant report. In the other relevant case, two villagers refused to nurse or come near their child, who was smitten with the disease, and disappeared on pretended business at the earliest possible stage of the proceedings for segregation. No man can speak with greater authority on the feelings of the people than the Chairman of the Tiruppattúr Municipality, himself a caste Hindu: he says, "Guards "are put on houses in which there is a patient. This is very little use . . . " . People might just as well be left to themselves, as they have a healthy "horror of infection and will shun an infected house, whether it be a case of small-"pox, cholera or plague." **Popular horror of infection.**

6. Let me add that neither Hindus nor Muhammadans can be considered very gregarious. Their systems of caste, religion and family divide them off into semi-isolated communities and, even within the limits of those communities, their opportunities for meeting one another are not as numerous and systematically provided for as amongst Europeans. Dr. Johnson would hardly have described them as a "*clubbable*" race. Moreover, they are not a people who travel as much as Europeans or as far. The train service, which serves our main lines of communication, would be hardly sufficient for the remotest rural tracts of England. All these considerations materially limit the importance of the agency of the human being as a means of conveying and spreading infection. **Lack of social intercourse amongst natives of India.**

7. There is, however, still more to be urged on this subject. Granting that the "contact" does come in contact with his fellow-creatures to some extent, how is the infection to be conveyed? Presumably, by means of his cloths. A little reflection will make it clear that the process of conveying infection from his cloths to the *broken skin* of another person would be a complicated process and one which would not be often realized in practice, and there is the further chance of the **Possibility of conveyance of infection direct from cloths to the skin.**

infection (which, to be most easily communicable, should adhere to the *outside* of the cloth) being desiccated by the sun in the course of his travels to his friends' houses or to business.

8. Do we find any of the kind of evidence, which we should expect to find, on the assumption that "contacts" were an important element in the spread of the disease? Do we find employés in offices or factories, gangs of coolies, inhabitants of one side of a street, next-door neighbours, members of a family or sub-caste, etc., taking the diseases *en bloc?* I will venture to give an emphatic negative to one and all of these questions, or let me say that, if we ever do find cases of groups of people being afflicted by the disease simultaneously, we shall find some *common cause* of infection. Hundreds of coolies are working at a factory; twenty of them handle rats or infected grain; ten out of these twenty coolies get the epidemic: no one else suffers (Simond, 643, Indian Plague Commission's Report, V, 98).

Human agency inadequate to account for epidemic character of plague.

9. Taking all these facts together, I submit the proposition that human agency is, by itself, wholly inadequate for the production of an epidemic, though it is sufficient to account for a few sporadic cases. I submit that, if it were not for the existence of railways, the human being as a spreader of infection might be considered to be almost a negligible quantity. This statement is, after all, little more than a deduction from the universally accepted statement that Plague is not, as a general rule, an infectious disease, as between human beings: but it is easier to give intellectual assent to propositions than to realize their full import and consequences. Human agency being, by itself, an insignificant factor in the spread of infection, what can the element of soil-infection contribute in this direction? Nothing whatever. Human infection can suffice to account for a few sporadic cases: recrudescence could account for the recurrence of such sporadic cases at intervals (*vide* paragraph 2 above): there seems to be nothing in either of these two factors, which would sufficiently account for the element of *epidemicity*.

The rat is practically the sole agent in rendering plague epidemic.

10. There must, however, be some explanation for the fact that plague *is* eminently epidemic in character: what then is the element which I have hitherto omitted to include in my analysis? The rat. I have endeavoured, by the use of a simple logical device and by an appeal to a few trite medical axioms and generally admitted epidemiological facts, to make it apparent, without recourse to recondite theories or to speculations in regard to the movements of rats, that the rat is not only the chief cause but may, for practical purposes, be regarded as the sole cause of the epidemic character of plague, though human agency is necessary to account for the transmission of the infection to distant places and countries, and the agency of the soil may partly account for the recrudescence of the disease (whether in a sporadic or epidemic form) after periods of quiescence. Now, the epidemic character of plague is the only feature in the disease which gives it its special importance and calls for the intervention of Government. However unpleasant its clinical characteristics may be, it would assuredly not be necessary for Government to give it any special attention, were there not the imminent danger at any moment of its assuming an epidemic instead of a sporadic character. Now, if the deduction just made is correct, the action of rats is necessary to impart this character to plague. Hence the *final* object of a rational plague policy will be the prevention of an epizoötic amongst rats, and the most rational plague policy will be that which tends to attain that object in the speediest, most direct, most efficient and most economical way.

11. I would not have ventured to submit a proposition, which, though some may deem it a truism, will appear paradoxical to others, if I were not in a position to avail myself of the support of authority and evidence. None the less, I have thought it best in the first instance to approach it from a somewhat broad standpoint, rather than to attempt to deduce it from the accumulation of individual instances. Epidemiological facts are, as a rule, incapable of *proof* in the strict sense of the word in this country, as District officers have, from time to time, been shown by the Sanitary Commissioner—(*vide* G.Os., Nos. 824, 824-A, P., dated 22nd July 1900; 270, 271 P., dated 5th March 1903; 1330 P., dated 18th November 1903; 198, 199 P., dated 27th January 1904), and I am by no means certain

that, if I were put to the proof of any one instance in which an epizoötic is believed to have preceded an epidemic, I should be able to satisfy the Sanitary Commissioner or even myself. My method of viewing and appreciating evidence of this kind is indicated in paragraphs 12 and 13 of Part I, and I submit that general impressions, paradoxical as the fact may seem, must be held to be of more value than the individual instances on which they rest. In any case, if the conclusions arrived at in the last paragraph be accepted, the view of the Indian Plague Commission that the burden of proof lies on him who asserts that rats or grain rather than men are the cause of any given epidemic seems to need revision. It is doubtless desirable to ascertain, if possible, the *distances* to which rats can spread an epidemic and the *time* during which they can prolong it; but, within those limits, I should be inclined to describe them as the sole means of transmission of infection of which any account need be taken, and, if any assumption at all is to be made in reviewing such ætiological questions as these, I submit that the assumption which seems best to cohere with the facts of the case is that, wherever plague exists in an *epidemic* form, the agency of rats must necessarily have been the efficient cause, no further proof being needed other than that of the epidemicity itself; the agency of human beings may be held to be *possibly* the cause of sporadic and isolated cases, but can only be entitled to be considered the *probable* cause, when the distance from the nearest centre of infection is beyond the limit ordinarily traversed by rats spontaneously or by grain in carts. If this view be accepted, it is clear that, in the majority of cases of infection, he who asserts that human beings are the effective cause thereof should be put on the defensive. The movements of the rat as a carrier of infection are infinitely freer, faster, and subtler than those of the human being: its main disability is that it cannot cover the enormous distances which mechanical contrivances enable man to travel in a short time: its rival, if I may so express myself, is not the human being on his feet but the human being in a railway-train or motor-car. I now proceed to set forth the views of the authorities, the practice in other countries and the evidence obtained in the course of my tour and otherwise on the question of rats.

12. All the text-books are agreed that rats are susceptible to plague in the same way as human beings. It has been noted by many observers that the ordinary type of rat-plague is a septicæmia, and it is noticeable, in this connection, that rats acquire the disease by feeding on infected material (Manson, 238), though men are not liable, except in very rare cases, to develop the infection in this manner (Part III, paragraph 3). Dr. Simond of the Pasteur Institute, Paris (Propagation de la Peste,' Annales de l'Institute Pasteur, 25th October 1898, pages 659–664) observes, as the result of his experiments, that rats, like men, are less susceptible to infection conveyed through the mouth than to inoculation through the skin. It is very important to note their extreme susceptibility. Dr. Hunter of Hong-Kong and Dr. Tidswell of Sidney (British Medical Journal of 15th August 1903 and Report on the Sydney Epidemic of 1902, page 65) find that a recently shaved rat can be infected with plague, by merely applying a culture to the shaved part of the skin, even though there be no visible puncture whatever. Susceptibility of the rat to plague:

13. Mr. Brodie and Mr. Ranganátha Mudaliyár have suggested that plague-infected rats could not travel far on account of the disease taking a violent and rapid form in their case. Recorded experiments made on rats by no means support the view that they die very rapidly (Indian Plague Commission's Report, V, 66): in such experiments, we hear of rats surviving 24, 48 and 96 hours and 5, 8 and even 12 days and then succumbing to the disease: within these periods, it is abundantly clear that the infected rats could travel long distances. Dr. Simond puts the usual period of incubation of the infected rat at 10 to 72 hours (page 680, *Loc. Cit.*). its migrating propensities.

14. How rats communicate infection to one another is a somewhat complex question and will be best discussed in full, when dealing with the rat-flea theory (*vide* paragraphs 21—28 below): but Colonel King (Plague Inspector's Manual, 16) and Captain Gordon Tucker draw attention to the fact that "the spread of "infection" is contributed to by "their cannibalistic habit of eating disabled members of their community." The form of Plague resulting from this practice would presumably be septicæmic. Thus, both in the manner of the original infection of Manner of spread of infection among rats.

rats and in the manner in which infection is communicated from rat to rat, we find a tendency for the septicæmic type of plague to predominate. This is a most infectious form of plague (*vide* paragraph 15, Part III), and its prevalence among rats may, perhaps, partly account for the fearful rat mortality which has been a feature of some epizoötics. I may note that Dr. Simond (678) appears to have made experiments on the transmission of infection by feeding rats with the flesh of dead infected rats with negative results.

(Experiments on the point.)

15. The Indian Plague Commission record certain interesting experiments, in which the original infection was passed through a series of rats by Mr. Hankin with the result of an attenuation, and the virus eventually died out. On the other hand, the result of a series of passages through mice was the exact contrary. Again, the intercalation of a series of cultivations of the virus seems to have diminished the process of attenuation. On this, the Commissioners ask whether this result is due to a special immunity of certain rats to plague or to a general effect produced on the bacillus by its passage through each and every rat. (Indian Plague Commission's Report, V, 57.) Dr. Danysz (British Medical Journal of 23rd April 1904, page 947) notices a similar attenuation of virus in the case of certain bacilli used for inoculating a series of rats. I shall have occasion to refer to this article in another connection. Dr. Simond found that some rats experimented on were actually or relatively immune to plague (pages 650 and 659, *Loc. Cit.*). The really important point would seem to be whether, in the case of rats on whom the virus produced no effect, bacilli none the less lingered in the blood and were capable of spreading the infection to susceptible organisms. If this were so, there would seem to be some bacteriological support for Dr. Simond's ingenious suggestion that the period of quiescence in plague may be a period during which none but immune rats are left alive and that recrudescence may be nothing but the growth of a new generation of rats which are susceptible to the disease. The evidence seems to be of a very speculative nature, though the hypothesis has a more direct relation to the observed facts than the views upheld by the Hong-Kong authorities in regard to the chronic nature of plague in man and the domestic animals. Dr. Gottschlich of Alexandria, in a paper read at the first Egyptian Conference, seems to support a somewhat similar hypothesis, on the ground that the period of the revival of the disease (namely Spring) corresponds, in Egypt, with the period of the multiplication of rats (British Medical Journal of 24th January 1903). Mr. Spencer has noticed certain rats, who live in the fields in the hot weather and come into the house in the cold weather (the period of recrudescence, in many cases), and, at the Guntakal Conference, I heard of town rats going into the fields at the time of an epidemic and causing immense damage to the crops. These facts are not without significance, and it is *conceivable* that rats might be occasionally responsible, one way or another, for a case of recrudescence in one or other of the manners suggested above, but I certainly could not venture to recommend the acceptance of any such theory as a working basis for action. Dr. Simond's hypothesis seems to deserve systematic bacteriological enquiry.

Susceptibility of mice and bandicoots.

16. This will be a suitable place in which to insert a few notes on the infectibility of other animals, and firstly the mouse. Mice are mentioned in the draft hand-bill at the conclusion of Colonel King's 'Rules for Municipalities.' In the Plague Inspector's Manual, he pronounces them infective, though in a less degree than rats. The other hand-books (Manson, 236–238; Jennings, 31, 40; Indian Plague Commission's Report, V, 54, 127) make little or no distinction between rats and mice in the matter of infectibility, and this seems to be the experience of the authorities at Sydney, Brisbane and Hong-Kong (British Medical Journal for 4th July 1903 and 15th August 1903; Lancet for 22nd August 1903). A case was reported to the Indian Plague Commission (page 127) from Porbandar, in which the death of mice preceded human mortality in the manner now familiar in the case of rats. So far as I can gather from the opinion of the authorities and from my local enquiry, there is very little to choose between rats and mice in the matter of infectibility, but mice are on the whole perhaps less urban in their habits than rats, so that their influence on the spread of plague is not so great. Bandicoots are not mentioned in the text-books, but I have evidence from Coimbatore, Tiruppattúr,

Hosúr, Anantapur and Cuddapah as to the death of bandicoots having been a feature of epidemics and as to their agency in spreading plague (*vide* also the Plague Report of the Collector of Salem for September 1901). Mr. Mullaly gave me an instance of a tame mongoose dying of plague.

17. The Indian Plague Commission give a very large number of instances in which squirrels have been infected with plague and in which epidemics have occurred amongst them. The other authorities give a similar account of their susceptibility. The Rev. Mr. Chamberlain and Captain W. H. Tucker were struck with the influence which they exercised in helping to spread the Vellore Epidemic of 1903. Captain Tucker was driven out of his house by squirrels and rats. Mr. Chamberlain had a case of plague in his godowns, preceded by the presence of dead rats and squirrels. I heard one instance at the Railway Conference at Trichinopoly of an European meeting his death by handling an infected squirrel: a similar case was told the Plague Commissioners unofficially. Dr. Chalke, Mr. Bardswell and Mr. Noyce have noted that squirrels spread plague ("like rats" according to Mr. Noyce), and their extreme infectibility has struck many other witnesses. They are less dangerous than mice or rats, in that they cannot work underground, but their habit of attaching themselves to the roofs of native houses renders them more formidable than the animals to be mentioned hereafter. squirrels,

18. The position of cats is somewhat peculiar. At Tiruppattúr (unofficially) as well as at Guntakal, Anantapur and Chittoor, I was informed that natives habitually kept cats in their houses, and in Guntakal it was said that the people regarded the cat as sacred and would strongly resent its destruction. I need hardly say that the practice of keeping cats is by no means confined to natives. I feel great compunction at pronouncing judgment on a deservedly popular animal and it may be that my reluctance has been shared by some of the authorities. The Plague Commission speak of cats as not being very susceptible, but they note that many epidemics amongst cats were reported to them. Major Jennings notes that they are susceptible in confinement, whilst Colonel King speaks of them as but rarely attacked (Plague Inspector's Manual, 9; Jennings, 31; Indian Plague Commission's Report, V, 54, 128). They have been found to be susceptible to plague in Johannesburg, Hong-Kong and the Punjab (*Lancet* of 28th May 1904, British Medical Journal of 15th August 1903 and Indian Medical Gazette for June 1904). In Bellary, Anantapur, Cuddapah, Kurnool and Salem many cases of mortality amongst cats have been noted. Colonel Pemberton kept cats in the Bellary District Jail, but one of them got plague, whereupon he destroyed them all. In the course of an epidemic in Anantapur town, which was almost coincident with my visit to that place, three cats died in the houses of Government servants. Many other officers speak from their personal knowledge of the susceptibility of these animals. When, therefore, they are put in houses to guard against mice, the proverb "*Quis custodiet* "*custodes?*" becomes applicable. Were it not for this position of trust and intimacy accorded to them by so many house-holders, they would probably be an almost negligible factor in the ætiology of the disease. cats,

19. All the authorities, including Sir Patrick Manson, note on the high susceptibility of monkeys to plague. I cannot help thinking that this must refer to some species peculiar to North India. It is true that I have had some evidence as to their infectibility, but singularly little, considering how much they frequent houses and wander from place to place. It is possible that the religious feelings of the Hindus may lead them to conceal such cases with particular care, but I cannot say that this is the impression which the conferences have left on my mind. Considering that they have so much communication with the interior and roofs of houses, I cannot help thinking that the infectibility of the species inhabiting the part of this Presidency infected with plague must be of a low order, though further local enquiry might perhaps serve to modify this conclusion. I can find no evidence to show that they are a factor in spreading epidemics. Dogs seem to be comparatively insusceptible and such is the verdict of the authorities. The series of experiments in Johannesburg and Hong-Kong quoted in the last paragraph as yielding positive results in the case of cats yielded negative results in the case of dogs. In Yannan, they are found to be not completely insusceptible but less so than the other animals examined (Manson, 242). A few authentic cases of plague monkeys, dogs,

amongst dogs have been brought forward, but I see no reason to think that they exercise any particular influence in the spread of plague.

cattle, poultry, &c.

20. As regards cattle, swine, elephants, poultry and the domestic animals generally, there are references scattered through all the text-books and magazines, but the invariable authority cited is the series of experiments conducted by Professor Simpson in Hong-Kong. The epidemic in the Sydney Zoological gardens in 1902 resulted in the death of some marsupials, an antelope and three guinea-pigs. Boccaccio, writing about an outbreak of plague in the fourteenth century, relates stories of the way in which various animals were attacked with plague: but his account is extremely fanciful (Jennings, 17). The Indian Plague Commission sum up the case thus:—"Inoculation experiments and the negative experience which has "accumulated from countless places in India would appear to show definitely that "cattle and the larger animals generally are insusceptible to the disease. Birds "appear to be almost incapable of contracting the infection." I have been able to secure no evidence whatever (with the exception of a doubtful case from Hosúr, narrated by Mr. Spencer) that any of the animals mentioned in this paragraph are susceptible to plague. I cannot help doubting, so far as India is concerned whether the animals mentioned above can be subject to chronic plague in the manner described by the Hong-Kong authorities; if it were so in any but the most exceptional instances, we should certainly expect some evidence of the fact to have come to light in the course of the last seven years: I find sparrows mentioned as susceptible to plague in North India. Various articles in the Medical Journals, dealing with the question of plague in the domestic animals, are printed in Appendix V. The text-book references are, Manson, 236, 238, 239, 242; Indian Plague Commission's Report, V, 54; Jennings, 31, 32; King, Plague Inspector's Manual, 9. I have lately received Government Memorandum No. 249 P., dated 15th August 1904, drawing attention to certain cases of bubonic disease in cattle and elephants in the Mysore State. I am hardly in a position to submit detailed suggestions as to what course it would be easiest to pursue, it any such calamity as an outbreak of plague amongst domestic animals were to appear in any considerable part of this Presidency. Their segregation in the fields might protect human beings against them, but how to protect them against rats would be a difficult problem: the mere fact that no epidemic has ever been brought to notice in this Presidency, in the face of the infinite possibilities to which domestic animals are exposed under existing conditions, seems, I submit, to amount to something like conclusive proof of their practical insusceptibility to the disease in the affected portion of the Madras Presidency.

insects: the flea.

21. The function played by the insect-world in the ætiology of plague is a subject round which controversy has raged, is raging and, one may predict, will continue to rage for some time in the future. From the days when Dr. Simond, in the ingenious and suggestive pamphlet already quoted more than once in the course of this chapter, formulated the theory that the flea and (in some degree) the bug were the main agencies by which infection was transmitted from rat to rat and from rat to man and from man to man, the matter has never been completely allowed to drop, though it received a somewhat contemptuous rejection at the hands of the Indian Plague Commission (Indian Plague Commission's Report, V, 75, 77). Sidney, Marseilles, Rome and Bombay have been the chief centres of subsequent investigation.

How is infection conveyed under the skin from the outside world?

22. The skin being the principal channel of infection for the human being and rats being the principal agency through which the human being is infected, it is inevitable that we should ask how the breach in the epithelium is effected (without which the virus cannot enter the system) and how the virus effects an entrance into that breach: common-sense would suggest that a possible means of entrance is supplied by lesions of all sorts, which, be it remembered, may be very small, in the case of rats, at any rate, quite microscopical (paragraph 12 above). Such lesions will, it may fairly be argued, be made in sufficiently large numbers by the ordinary chances and contingencies of daily life to lay the human body open to attack under the most ordinary conditions. The virus, whether it comes from the rat or from any other source, may be presumed to adhere largely to the floor

and lower part of the walls of a native house, and it is plain that the conditions of the poorer class of Natives, as described in paragraphs 11, 12 and 49 of Part III, lay them open to the chances of infection through the broken epithelium in a variety of different ways. As regards the ways in which rats can spread infection, *vide* paragraph 14 above. Colonel King (Plague Inspector's Manual, 83) alludes to Professor Lustig's view that the urine and fæces of an infected rat contain the microbe. Sir Patrick Manson sets forth in considerable detail the means by which a rat can and does convey infection (page 242).

23. Most persons, who had no special knowledge on the subject of plague and who were shown the seat of a plague epidemic, would, I think, express wonder, not at the severity of the epidemic, but at its having left any human being alive and well: the 5 per cent. or 10 per cent. mortality would seem at first sight a small percentage of lives to be claimed in the name of outraged sanitation. Doubtless (as will be shown in its proper place) this peculiarity may, in some degree, be attributed to the operation of fairly effective preventive and remedial measures, but, even on occasions when such precautions have not been taken (*vide* Part XI, paragraph 6), we do not find that the rate of mortality runs much higher than 30 per cent. of the population of the affected area. That this indicates some restraining force on the incidence of plague has been observed by Dr. Ashburton Thompson in the course of his elaborate and highly instructive report on the Sidney Epidemic already referred to (paragraph 261). As he expresses it "Among the conditions "necessary to the spread of infection from rat to man, there must be some one con- "dition (at all events) which is rarely present in conjunction with all the rest: can "failure to bring the minute wound into contact with the small quantity of deposited "infection be it? Clearly, such failure must happen much more often than not."

24. Many will be ready to take advantage of the candour with which Dr. Ashburton Thompson puts, in its most convincing form, an hypothesis directly opposed to his own, and I confess myself to be amongst that number. The hypothesis seems, in my humble opinion, to offer the elements which the tempered epidemicity of plague would seem to demand, namely that the communication of the infection should necessitate the concurrence of more than one eventuality, *i.e.*, (*a*) a breach of the epithelium, (*b*) the presence of infective material, (*c*) the application of the infective matter to the breach. Condition (*a*) we have seen to be one of great frequency. Condition (*b*), at the "rat-dropping" stage of an epidemic, is also of extreme frequency; both these causes are widely distributed over the whole area of an epidemic: condition (*c*), on the other hand, will, by the doctrine of chances, be of comparatively rare occurrence. Is anything further required?

25. The curious fact is that the arguments in favour of the rat-flea theory can be put into almost exactly the same form. We have condition (A), namely, the presence of numerous infected rats, which, shortly before and shortly after death, swarm with fleas. This fact is noticed by all the authorities, and I have received abundant confirmation of it, as the result of my local enquiries. Mr. Richards, for example, was attacked by fleas, when he went near the corpses of some rats. Major Ffrench (Part IV, paragraph 12), Major Wright, Captain Gabbett, Dr. Gibson, Mr. Noyce and Mr. Atkinson have been struck with the number of fleas on the corpses of rats and have all been driven thereby to the conclusion that such fleas must in all probability be a means of communicating infection. Again, we have condition (B), the presence of the human being in proximity to the dying rats: advocates of the theory lay great stress on the admitted importance of evacuation and the comparative safety of the Plague Hospitals, on the ground that they are the negative of an indispensable condition, namely (B). I would note, however, that they are also the negative of condition (*c*) under the former hypothesis. **The rat-flea theory of infection.**

26. The third condition (C) is that the rat-flea should bite the human being. In Sydney the *possibility* of this has been established by Dr. Frank Tidswell (*vide* Dr. Ashburton Thompson's article in the Lancet for October 17th, 1903 and paragraph 284 of the Sidney Report). The fleas dealt with were *Pulex Fasciatus* and *Pulex Pallidus*, of which the latter is a species which affects Indian rats. This flea is not naturally parasitic to man and, in Dr. Tidswell's experiment, would only bite a human being after being kept for some time without food. Thus an element

of infrequency is supplied. There is, however, a fourth condition requisite, namely (D) that the bite should result in the inoculation of the human being with the virus. How can this be done? There is, as Colonel King suggests (Plague Inspector's Manual, 78, 82), the possibility that the microbes may "gain entry, not by "means of insertion by the insect at the time of biting, but by being brought into "contact with a cut or abrasion caused by scratching, on the insect being smashed "on the skin." This possibility will hardly be denied by whoever has accepted the hypothesis advanced up to this point, whether the bacillus be supposed to be adhering to the external surface of the flea as a stain contracted in the act of biting the rat or whether it be supposed to be within the body of the insect. The first explanation would require that the transference of the rat-flea from rat to man should be effected very speedily: the second explanation, as well as the third possibility (considered improbable by Colonel King), are matters for bacteriologists to decide, and it may be predicted that they will be decided before very long. Meanwhile, Colonel King draws the highly important practical conclusion that dead rats (especially newly dead rats) should be handled with extreme caution. They should either be soaked with the disinfectant solution, or (as Dr. Simond suggested) boiling water should be poured over and round them, before they are touched. Many lives have been lost through neglect of these precautions (*vide* Simond, 643; Indian Plague Commission's Report, V, 76 and 98; Manson, 241 and 243; British Medical Journal for 14th May 1904, paragraph 6 of Part III of this report, paragraph 8 of the present chapter; also Mr. Coleridge's and Dr. Elliott's experiences and an interesting case from Kollegal related in the Guntakal Conference).

27. There are many interesting arguments on record for and against the "rat-flea" hypothesis, but I do not consider it permissible to quote them *in extenso*, as they do not settle the question and their practical bearing is comparatively remote. The Sidney Report (page 57 and onwards), the text-books, the relevant portion of the Plague Commissioners' Report, various articles printed in the appendix and, last but not least, Dr. Simond's brochure give the arguments and experiments on both sides. There is not much to be said as to the practical bearing of what has been advanced so far. That Europeans should keep their houses, as far as possible, free from fleas, bugs, lice, mosquitoes and vermin generally is so obviously desirable on all accounts and is already so generally accepted a principle that the fact that they may be the means of transmitting plague is hardly needed as an additional stimulus. Similar advice is given to Natives in the draft hand-bill appended to Colonel King's 'Sanitary Rules for Municipalities': instructions on this subject would naturally be included in the hand-book suggested in paragraph 51 of Part III of this report: how far they could or would be complied with is another matter. It must be remembered that *Pulex Pallidus*, which is the flea to be chiefly guarded against, is a *rat-flea* and will, therefore, in most cases *accompany* the sick rat into the house. The removal of the danger from this parasite would be probably effected in the simplest and best way by the removal of its host—the rat.

Relative importance of flea and of inanimate matter as conveyers of infection.

28. As to the relative importance of the flea and of inanimate matter as means of conveying infection, I would not venture to express an opinion. The facts in relation to the Sidney Epidemic of 1902 can hardly be held to *prove*, at the utmost, anything more than the *occasional* agency of the flea, though they are doubtless consistent with the theory that the flea is the *habitual* transmitter of infection. The logical problem is one of which the merely formal solution would offer formidable difficulties: given two occasional but exceptional causes and an infrequent result, are we to attribute the result to one or both causes and, if the latter, in what proportion? In any case, whichever view is accepted, the startling result is obtained that every case (or almost every case) in which a human being is infected with plague is due to a fortuitous and exceptional set of circumstances. It may be observed that the rat-flea theory cannot for a moment be compared with or gain any support from the discovery of the action of the anopheles on the malarial parasite. The malarial mosquito is fulfilling its proper function in infecting the human being: that the rat-flea is acting in an exceptional manner is of the essence of the rat-flea theory: if, for a moment, it were assumed that the rat-flea, in biting

the human being, were fulfilling its natural function, the cause would at once be seen to be utterly out of proportion to the effect and the theory would collapse. As matters stand, the only safe assumption seems to be that both insects and inanimate matter may operate as carriers of infection, and that, as far as practicable, both agencies should be guarded against. Bugs come under suspicion to almost the same extent as fleas, and also lice in some degree (Manson, 241; Jennings, 32, 41).

Spread of infection by ants, flies,

29. It will be observed that the discussion of the part played by fleas, bugs and lice in spreading infection has involved the complete discussion of the question alluded to at the end of the first paragraph of this chapter. A few more insects and reptiles remain to be dealt with. It would seem, from Captain Niblock's evidence, that ants may sometimes play a similar rôle to fleas. They are mentioned, with the other insects already referred to, in Colonel King's draft hand-bill. Isolated instances have been given me of apparent susceptibility on the part of snakes and blood-suckers. It is theoretically possible that mosquitoes should convey infection, but there is little evidence on the subject, and none of the authorities give any support to the suggestion. Flies, on the other hand, have acquired what may be called a classical position in plague literature, by reason of the experiences of Yersin and Sablonowsky (Manson, page 241). Bacilli have been found in their bodies by more than one observer (*Loc. Cit.*; Jennings, 41; Indian Plague Commission's Report, V, 129 and paragraph 2 of Colonial Report, No. 25, Hong-Kong, December 1903). Mr. Macleod notices that they haunt the stalls of sweetmeat-sellers and that that class of persons are peculiarly liable to infection. There may, I think, be other reasons to explain the susceptibility of this class of traders, and the part played by food infected by flies in spreading infection must probably be, as the Commissioners observe, a very limited one "in view of the fact that plague does not, at any "rate in the case of man, appear to be contracted" (I would venture to insert the word "usually") "by means of the alimentary canal." Major Wright suggests that they may sometimes convey infection from excreta, etc., to human beings, through the medium of open sores.

birds.

30. A word may be added as to the possible direct *conveyance* of infection by birds and animals. Pigs and dogs may possibly convey infection by bringing carrion into houses: cats may clearly do the same in disposing of their natural prey: with regard to birds (and principally crows), several observations are on record. In the recent number of the Indian Medical Gazette, referred to at greater length in paragraph 16 of Part VI, we are told that, when an epidemic becomes severe in the Punjab, crows usually desert the infected village and do not return until the epidemic is over. Mr. Clegg again "observed a curious sight in the Tiruppattúr Bazaar "street, thousands and thousands of crows at six in the evening, perched on the tiles, "apparently pecking for vermin" (G.O., Nos. 824, 824-A, P., 24th July 1903). Major Ffrench believes that "crows and kites are often the cause of spreading plague, "by sometimes carrying rats from one village to another and certainly from one house "to another in the same villages and towns." He observed this in Vániyambádi. Dr. Elliott (Kolar) gives an interesting case in which a vulture dropped a dead rat in some police lines, thereby causing a small epidemic. This has already been cited as an instance of the danger of handling dead rats without due precautions (paragraph 26 above). Birds, in general, may convey infection, not only by conveying dead rats, but also through the medium of any soiled material which may adhere to their plumage or claws. Evidently their action in the dissemination of plague is one argument the more in favour of care in the matter of unroofing.

Agency of wind in spreading infection.

31. This seems a convenient (though not logically correct) place in which to note Mr. Brodie's suggestion that the microbe may be sometimes disseminated by the agency of the wind. One or two of the witnesses examined by the Plague Commission made similar suggestions (Indian Plague Commission's Report, V, 129, 130). I would suggest, as a limiting force to this operation, that the same agencies, which crumble and dry up matter in such a way as to render it liable to conveyance by wind, operate as a desiccating and sterilizing agency and will, therefore, as a rule, have rendered it harmless before it is rendered viable.

32. Paragraphs 16 to 31 must be regarded as parenthetical, so far as the main subject of the chapter is concerned, though I have been incidentally enabled to discuss (paragraphs 21–28) the last stage of the cycle of infection, before the re-infection of the human being, at which point I (arbitrarily) commenced the whole discussion (Part III, paragraph 1). In paragraphs 12–15 of this chapter, I discussed such facts as were available in regard to the manner in which rats contract and retain the infection and communicate it to one another. The extent of their influence in spreading infection amongst human beings has now to be discussed. The views held by the authorities will first be cited.

Opinions of authorities on the agency of rats in spreading plague.

33. In Sir Patrick Manson's book, we find that "many observers have remarked "the great mortality among rats which precedes and accompanies outbreaks of "plague in man." He quotes Rennie's observations regarding a Canton Epidemic. "From districts of the City where the plague had been raging for some time "the rats entirely disappeared, whilst they kept on dying in other quarters to which "the disease afterwards spread . . . . These and many similar facts observed "in Bombay, Sidney, Cape Town and Hong-Kong with regard to plague in the "lower animals throw important light on one of the ways in which the disease is "to be met. They have to be reckoned with in the future, more than they have "been in the past, in devising schemes of quarantine and in attempts at stamping "out the disease in already affected localities. The wholesale destruction of "vermin" is recommended. Again, in connection with paragraph 8 of this chapter, I would quote the observation that "the extension of plague epidemics is peculiar. "Sometimes it skips a street, a village or a district, to appear there later." Again, as regards prophylaxis, "Rats and mice should be poisoned or otherwise "destroyed and their bodies burnt . . . . In the event of an outbreak in a "town, it must be borne in mind . . . . first, that there is an intimate "connection between rat-plague and human-plague; second, that rat-plague is "conveyed to human beings, ... and, third, that a plague in rats usually "precedes plague in human beings . . . . a house in which a plague rat is "found is a plague-infected house . . . . Considering the well-established "fact . . . . that in many epidemics" the rats "have been attacked weeks "before the disease has shown itself in man, ... there can be little doubt "that these rodents play a very important part in the diffusion of the introduced "virus. This being the case, it is reasonable to believe that, if the rats were "destroyed, the risk from the introduction of a case of plague, whether by man, rats "or fomites, would be very much reduced in any community in which the measure "was carried out . . . . The destruction of rats is a cheap measure in "comparison with those adopted in India and elsewhere, and which have so signally "failed to arrest epidemic plague" (Manson, 241, 243, 244, 255, 256, 257). It will be observed that the views submitted in paragraphs 10 and 11 above are little more than a paraphrase of the views now cited, except that I would submit that, so far as this Presidency is concerned, I am by no means convinced that the measures actually adopted have been as barren of all result as is stated above. This point, however, will come up for discussion in Part XI.

Views held in other countries on this matter—Hong-Kong,

34. My information in regard to other countries has been mostly gained from a perusal of recent Medical Journals and such other official reports as were kindly supplied to me. In most instances that have come under my notice, I find the pre-eminent importance of the rat recognised both in theory and practice. The course of speculation in Hong-Kong offers an apparent exception: there, bacteriology, starting with man and the rat, has passed a large part of the animal world in review and has finally completed its cycle of experiment by returning to man in the capacity of a chronic conveyer of infection. With all deference to these bacteriological experts, who know so much of a subject of which I know nothing, I have ventured to submit that their conclusions seem to conflict with such epidemiological facts as have come within my ken (*vide* paragraph 20 above and Part III, paragraph 14). Still, their speculations can hardly be advanced as any authority for not taking the animal world into account in connection with the prophylaxis of the disease. A variety of articles, written from the stand-point of Professor Simpson and Dr. Hunter, will be found in the appendix.

35. Many parts of South Africa seem to have suffered from plague at one time or another. I find that Cape Town suffered from an epidemic in 1901: an experiment was accordingly tried in the direction of exterminating rats by the use of M. Danysz's virus: it seems to have been completely successful and Cape Town is referred to as "the only place in South Africa which has really got rid of plague "after it had once become established." This subject is referred to more fully in paragraphs 41 to 44 of Part VII. Johannesburg was the scene of an outbreak of plague early this year. It is noticeable that the first intimation of the existence of plague came from the laboratories and was the result of elaborate examination of rats and other animals submitted for analysis. The epidemic has been alluded to in paragraph 23 of Part IV, but it may be noticed in this connection that a galvanised iron fence was erected round the whole location and every rat, cat, dog, fowl or other creature found inside was caught, killed and burnt. The municipal authorities of Johannesburg are especially praised for their well-equipped laboratory (British Medical Journal for the 9th and 23rd April and the *Lancet* for 28th May). South Africa,

36. In Australia, there appear to have been a series of what we should consider extremely mild attacks of plague. For example, a recent attack in Brisbane (Queensland) led to only 26 cases and 14 deaths, and the Sydney (New South Wales) Epidemic of 1902 (which extended over about six months) resulted in 139 attacks and 39 deaths. This attack is minutely described in the report already alluded to and seems to have extended over almost the whole city. The measures adopted were isolation of the sick, disinfection and "rendering the wards rat-"proof." I am not aware how this was accomplished: but the general principles which have guided the Board of Health in their campaign against plague are sufficiently indicated in the opening portion of the report, where we read that "here in Sidney we formed the opinion in 1900 that plague-rats constituted the "sole source from which the infection was communicated to man," and it is clear, from the whole report, that all outbreaks of plague in Sidney are dealt with on the assumption that the rat is the only agency in spreading plague which need be taken into serious consideration. The success attendant on this operation (39 deaths in a large city) is the best evidence in support of the validity of this hypothesis. The steps taken in connection with the Brisbane Epidemic deserve quotation: "During the past three months, 3,274 rats were received for bacteriological "examination . . . . 2,769 rats were also destroyed without examination ". . . . , Some 120 men have been employed . . . . in the work of "rat-destruction, laying poisoned baits, setting traps, digging out rat-runs and "burrows, removing carcases, taking up rat-eaten floors, removing waste food "materials and disinfecting the soil beneath floors where rats were found." Beyond segregation of contacts for six days (a practice which was discontinued in Sydney in 1902) and insistence on sanitation, no other measures taken are thought worthy of mention, except those for disinfecting vessels and preventing the importation of rats from them. Here again, the epidemic resulted in a very small loss of life (British Medical Journal for 4th July and 21st November 1903, 9th March and 14th May 1904; *Lancet* for 3rd and 27th June and 22nd August 1903). Australia,

37. The views held in Egypt on the subject of rats were indicated in paragraph 15 above. Russia was the scene of a celebrated experiment on Dr. Danysz's lines, by which the rats in Odessa city were exterminated and an epidemic of plague stamped out in 1902. The article quoted in paragraph 35 above contains an account of this campaign. The French Government has since conferred on M. Roux (the head of the Pasteur Institute, in which M. Danysz is a worker) the Order of Agricultural Merit, in connection with a successful campaign against rats in the Charante Department of France. It appears that a small experiment was conducted in Hamburg on M. Danysz's lines. The method has also been recommended for adoption in England. As regards Japan, I append a quotation from Major Jennings's work (page 196): "Tsukiyama, the chief of the National Board of Health "in Japan, considers that it is possible to exterminate the plague in infected cities "mainly by destroying rats systematically. In support of this view, he points out "that the plague was arrested in a few months in three cities and was extermi-"nated by a short application of the measure in the case of a fourth, after it had Egypt, France, Germany, Japan,

"prevailed for some years." Finally, I may allude to a lecture of a Yorkshire Medical officer, who, speaking of the mild attack of imported plague at Glasgow and of the difference between the experiences of Great Britain in 1665 and 1900, attributes our better fortune in these days, amongst other things, to the fact that rats were destroyed in great numbers in connection with the Glasgow attack. The articles, from which these views and facts are taken, will be found in Appendix V. The Glasgow circular (Jennings, 225–227) is a most remarkable document, having regard to the unique importance which it attributes to the rat as an agent for the dissemination of plague.

Glasgow

38. The conditions of my appointment have not permitted me to make any complete enquiries into the manner in which plague is regarded and dealt with in other countries, but I cannot regard even the somewhat meagre data set forth above as wholly valueless. As the views, which I have ventured to submit in paragraphs 10 and 11 above, seem hardly to be in accordance with those authoritatively held in India (as I shall have to show in due course), I am anxious to avail myself of all the support that I can obtain, and I apprehend that the fact that experts and administrators in Europe, Africa and Australia join in attributing unique importance to the rat as an element in the spread of plague and in sparing no money or pains to ensure its destruction will, in some degree, absolve me from the charge of presumption in submitting views which seem somewhat at variance with theory and practice in this country. That the views held in other countries should be allowed all the weight which success can confer will also appear from the records printed in Appendix V.

and other parts of India.

39. The practice in other parts of India has not come within the scope of my enquiry, but, in an interesting and instructive report on Plague Operations for 1902–1903 in the Amritsar district, I find not one word to indicate that the smallest action is taken in regard to rats, inoculation and (in a minor degree) disinfection being apparently the only measures in force, and Captain Gordon Tucker, writing from Bombay, remarks that "the theory that the epizoötic in rodents is the cause "of an epidemic amongst human beings is a *pernicious* theory, not so much because "it is only half true, but because the modern tendency to put rat-destruction in the "fore-front of preventive measures" (I presume that the writer is referring to tendencies operating in other countries) "diverts the attention of the authorities "from *more important* details." The italics are mine. I am led by these citations to conclude that the views held in other parts of India would, as a rule, be adverse to those which I am endeavouring to advocate. Statistics by no means indicate that methods in other Presidencies compare favourably with those in our own Presidency in regard to results (*vide* Part XI).

Opinions of authorities on the rat as a medium of infection.

40. Major Jennings says of rats that "although individually they are not as "important as human beings taken as foci of infection, taken as a whole, they "cannot be considered to fall short in importance, seeing that so many more of "them than man contract the disease . . . . It is highly probable that "one part of a town may be infected by their agency from another, or a village "from a very adjacent one . . . . It is not only necessary that an "organised scheme should be adopted for their wholesale destruction, when plague "threatens in a place, but also . . . . that the importation of rats from "infected to healthy places should be prevented." Major Jennings alludes to, but does not discuss, the views of Manson as well as those of Koch and other eminent authorities that "plague is primarily an epizoötic and that epidemics amongst men "are secondary to and dependent upon primary epizoötics among rats" (pages 39, 40, 195, 196, 203). If Major Jennings's views put the case against rats as strongly as the facts allow, it is plain that some fallacy lurks in the first nine paragraphs of this chapter and that the views expressed in paragraphs 10 and 11 are of a highly exaggerated nature.

41. The Indian Plague Commission discuss the specific question as to the relative importance of men and rats in disseminating the infection of plague within the limits of an infected village, *i.e.*, in causing an epidemic. Their conclusions (p. 132) are expressed in six propositions, of which the last two may be regarded as a summary of their views: "(5) The chief importance of rats in the epidemiology of "plague seems to us to arise in connection with the first outbreak of the disease in

"an infected place, for we have seen that, in many instances, rats become infected "before men and they scatter infection broadcast over an uninfected place; (6) "When plague is once established in a place, we have no doubt that human agency "is a more important factor in spreading the disease than the agency of rats," and, shortly before, they say that "it is difficult to obtain a basis for a safe generalization. ". . . . . In some cases men and in other places rats appear to have been "the agents which were most directly involved in the dissemination of infection." The import of these propositions is not very clear to me, but I am led to infer that rats could not have appeared to the Commissioners to be a factor of any great importance from the fact that they have made no recommendations at any stage of their report in regard to the manner of dealing with rats, though they observe that a disinfected room "is liable to be re-infected by the agency of rats and men." This, if I may venture to say so, seems a curious *lacuna* in a report on plague It may, perhaps, be said that, where no practical remedies suggest themselves, no recommendations can be made; but, had measures against rats appeared *desirable*, though impracticable, it seems reasonable to suppose that this would have been specifically stated in the course of the report. It would seem as if the point at issue must really have been the question whether it was *worth while* to spend money and time on rats, inasmuch as the President, in a minute of dissent (p. 509), *does* include the destruction of rats in his plague programme, and that apparently on the direct issue of expediency, not practicability. There are other indications of the spirit in which the Commissioners approached this momentous question. Before reviewing the evidence in regard to the introduction of infection into an uninfected place by rats, they rule that "there will, in the case of every infected place, in the "absence of evidence to the contrary, be a strong presumption that the infection was "introduced by men. When, therefore, it is alleged in any particular case that "plague has been imported by rats, it would seem necessary to show that plague "cannot have been imported by direct human communication or by means of "infected articles. It is obviously impracticable, in any given case, absolutely to "exclude these possibilities, or, in other words, definitely to prove conveyance by "rats" (page 108). This seems to raise an irrefutable presumption against advocates of the rat-theory. I fully admit that the Commissioners have been kinder to the advocates of the theory than their principles would warrant, but the principles themselves, thus formally enunciated, seem, in my respectful opinion, to have survived the report in which they occur, to an extent which is not altogether desirable in practice. I have ventured to submit my own views in this matter in paragraph 11 above.

42. Colonel King's views are expressed in pages 16 and 17 of the Plague Inspector's Manual. I find that, "whilst rats move from one part of an infected "inhabited area to a healthy part in close proximity, it is very unlikely that this "transfer occurs from one village to another that is separated by any considerable interval . . . . It is certain that in ordinary cases it is not the "rat but the human being that introduces plague in the first place." The possible action of grain and of rats transported by human agency is carefully excepted. So far, I do not think that the weight of Colonel King's experience and authority is against my own views as set forth in paragraph 11. The question is: what is the "considerable interval" beyond which rats will not move voluntarily and beyond which grain and rats will not usually be conveyed?

43. Later on, it is said that "although there are exceptions to the rule, it may "be accepted as a fair sanitary deduction that the appearance of plague in the midst "of the rat population shows that the authority responsible for the important duty "of giving first intimation of cases of imported plague has neglected his duty." Here again, as I ventured to point out in paragraph 39 of Part III, there is an appeal to hopes and fears, which, though it may have many administrative advantages, somewhat tends to obscure evidence. A Sanitary Inspector naturally does not wish to incur any suspicion of neglect of duty and will therefore have a tendency to secure a "history" of human importation at all costs.

Instances of spread of infection from one village to another by the agency of rats.

44. Let me take a concrete instance, namely my inspection of the Ilitorai case. Here we have a history, which stretches as far back as the death of rats and no further We have to bridge over an interval of six weeks and a distance of 4 or 5 miles. Careful local enquiry reveals no further clue and there seems no reason to

suppose that any further evidence could be found. How would the Plague Commissioners decide this case? Clearly, if they followed their own principles, they would call on me to prove that plague *cannot* have been imported by human communication. This I could only prove on the assumption that all my witnesses were incapable of telling untruths. Therefore, my case fails. The Plague Inspector's Manual takes the same stand-point and draws the practical inference that the village munsif is departmentally responsible for not reporting the (presumed) imported case which led to the dropping of rats, unless he can prove that this is an "exception to the rule" that human beings introduce plague into villages. The defence of a village munsif in difficulties is not likely to assist me much. Again, my case fails. No one, I admit, would dream of carrying this last principle into *practice* in such a case, but this, in my respectful opinion, is proof that the principles themselves stand in need of revision.

45. I am ignoring, it may be said, the fact that the object of our text-books is primarily administrative. Even allowing that this is so, it is permissible to regret that administrative necessities should compel us to prescribe lines for the enquiry into first cases of imported plague, which seem so very unfruitful for ætiological purposes. In this case, for example, the real point at issue can only be raised, if the enquiry be started with an absolutely open mind. If this be done, it becomes clear that the fact of human importation, which *could* be proved, has not been proved, and that the facts disclosed render it decidedly improbable, and we have Bishop Butler's authority for the proposition that, in practical matters, "probability is the guide of life." If the element of human importation be excluded, how did the infection reach the village and where did it come from? There is no evidence of importation of grain in large quantities from anywhere, nor of importation of any grain from an infected locality. There is no evidence of any case of plague in the neighbourhood within six weeks: even before that date, there is no evidence of plague within 4 miles of the village. There are other secondary data, which will be found in Appendix IV. The proper conclusion from the facts is, I submit, that there is a *probability* of the infection having been kept alive by rats during six weeks and a *possibility* of their having, in the course of that time, transported the infection spontaneously over the requisite 4 or 5 miles. The first weak point in the second hypothesis is the lack of evidence of infection amongst rats or human beings at intermediate points in the course of the 4 or 5 miles, but it has to be noted that the intervening country is jungly and sparely inhabited. The second weak point is that there is always a possibility (using the word in a practical sense) of infected grain getting into a village without the fact being known to anybody. If we had records in regard to a large number of cases of this kind (for I cannot suppose, having regard to the doctrine of chances, that I struck on an altogether exceptional case), we should be in a better position to judge whether the second hypothesis should rightly be called a *possibility* or a *probability*, but our ætiological principles are of too rigid a description to encourage local officials (who have their own work to do) to embark on enquiries which may seem to have an heretical tendency. Hence, I submit, the comparative barrenness of our epidemiological record for the last five years. This will be a grave misfortune in the eyes of those who subscribe to the truth of the observation with which Dr. Ashburton Thompson concludes the Sidney Report: "I venture to express a hope that the field of "epidemic plague, which has hitherto been given over almost entirely to the "bacteriologist, may soon begin to be laboured at by the professed epidemiologist, "whose peculiar function it is to discuss and exhibit the phenomena of communi-"cable diseases, as they are manifested under the variable conditions of daily life." Many of our local officers are, I apprehend, quite capable of accumulating from the "variable conditions of daily life" ordered sequences of phenomena, which might be of the greatest value. If such records were in existence, my work would not have had to take such a speculative shape as is unavoidable under existing conditions.

Evidence of witnesses on the point.

46. I will now set forth the evidence which I have been able to collect in regard to the agency of rats in spreading plague from village to village. It will be observed that, in a note appended to my Ilitorai Inspection Notes, Captain Gabbett remarks on a somewhat similar case which came to light shortly afterwards.

Several instances were given to the Plague Commission, in which rats could be shown with a high degree of probability to have travelled long distances from their own villages and to have spread plague thereby: in one case in Sirohi State, rats infected six people camped out near a well and engaged in harvesting corn at a distance of about $1\frac{1}{2}$ miles from the infected village. The Commissioners, in spite of their rigid system of weighing evidence, are driven to admit that these cases are evidence that individual rats may travel far a-field from plague-infected places (pages 106–111). Several cases were reported of the spread of plague by means of rats from village to village in the neighbourhood of Bombay and Bandra: these also are accepted by the Commissioners as proved. The case of Chak Kalal (page 125) is a very beautiful one, but it seems preferable to cite two local cases given me at the Guntakal Conference: "Puliki, a village in this district, was surrounded by "infected villages, though it escaped itself. A dead rat was found in the village. "The people immediately left the village and the usual remedial measures were "adopted, with the result that the people escaped from the disease. In this case "it is to be presumed that the rat must have become infected from one of the "surrounding villages. Another village, Malapuram, offers an exactly similar "instance." The situation of the village of Chak Kalal was exactly similar, except that there the villagers *returned from* evacuation and thereupon contracted the disease. The evidence as to emigration of rats from infected villages, given me at the same conference, is noted in paragraph 15 above.

47. Mr. Spencer and Major Ffrench (from their Salem experience) are strongly of opinion that rats spread plague from village to village and note that they have seen dead rats or traces of rats in open country remote from houses. The history of opinion on this matter in the Salem district is decidedly instructive. In 1899 (G.Os., Nos. 1569, 1569-A./P., dated 31st October 1899), we find Mr. Clegg giving gunny-bags (material liable to contamination by rats) as a source of infection: the Sanitary Commissioner is inclined to doubt the possibility of this on theoretical grounds. It is also noticeable that at that time the local authorities in Salem vigorously prosecuted the destruction of rats. In G.Os., Nos. 824, 824-A /P., dated 24th July 1900, the Collector of Salem considers that rats are the cause of the infection of the frontier villages of the district. The Sanitary Commissioner observes that this is not proved and that "it will not do for it to be accepted that rats pass from "one village to another bearing infection with them *in advance of the human being* "without more demonstrable proofs. Indeed, the acceptance of such an opinion "would encourage the hopelessness, etc., ..." In the same report, the District Medical Officer emphasised the importance of food-stuffs (also liable to contamination by rats) as a means of introducing infection. This view also was not found acceptable. The Sanitary Commissioner remarks that "the Collector of "Salem alone refers to the interesting subject of methods of spread of infection." No adverse inference, therefore, can be drawn from the silence of other Collectors: they are not witnesses for or against any particular theory of importation. The destruction of rats was taken in hand on a small scale. In G.Os., Nos. 982, 982-A /P., dated 3rd October 1901, Mr. Spencer raises the question whether rats as well as men cannot be regarded as spreaders of infection from village to village. His views deserve quotation in full: "It is not unreasonable to suppose that rats will desert a village "where great mortality among their species has been going on and . . . . "traverse short distances of a mile or so at night. The manner in which the "circle of infection has widened gradually in the case of Matigiri, Bagalur and "Gumalapuram, till it extended to the surrounding villages, the sudden disappear-"ance of every rat from the centre where plague started, the mortality among "human beings being almost invariably preceded by mortality amongst rats, are "all facts pointing to the conclusion that they do migrate when they are sick and "when the plague-germs are in the stage of incubation in their bodies and thus "spread the disease not only from house to house in a town or village but also "from village to village." Mr. Clegg forwarded these views with an expression of concurrence, and the late Major Grant (then acting as Sanitary Commissioner) considered them "interesting and in thorough accordance with the general belief "of authorities on the subject." There is no mention of any measures for the destruction of rats. Once again (in G.Os., Nos. 270, 271-P., dated 5th March

Opinion in the Salem District.

1903) Mr. Clegg, Mr. Spencer and Major Ffrench emphasise the importance of rats and grain as means of importation of plague into villages, and again a verdict of "not proven" is recorded by Colonel King. In G.Os., Nos. 198, 199-P., dated 27th January 1904, the Acting Collector (Mr. Richards) makes no reference to the origin of infection in villages. As noted above, however, Mr. Spencer and Major Ffrench still retain the view that rats act as carriers of infection from village to village.

48. I submit that a history of sustained and deliberate opinion of this kind is worth more than many individual instances, each of which may be susceptible to adverse criticisms: it has to be observed that the opinion was formed on the spot and by dint of repeated observations imposed on the officers in question by the exigencies of their daily avocations. When an opinion can be re-inforced by the observations of five years, it can hardly be considered to rest on facts of an exceptional nature. I would, therefore, submit that the evidence adduced up to this point goes some way to rebut the presumption raised in the Plague Inspector's Manual that the existence of dead rats in a village is fair ground for inferring neglect of duty on the part of the local authorities. Rats can travel 1½ miles admittedly (I should be inclined to put it at 4 miles) and grain can of course be carted a great deal further and either convey rats to its destination or communicate infection to rats, when it has reached its destination. Within these limits, I cannot see what justification there is for any adverse presumption in the matter. I am fully alive to the necessity for keeping village munsifs to their duties, but, in practice, no presumption of the kind indicated would ever be made a ground for departmental punishment, and meanwhile the presumption tends to operate in the direction of trammelling ætiological speculations. It would be a decided change for the better, if (as suggested by one of my witnesses) a village munsif could be made responsible for the *live* rats in his village instead of the *dead* ones.

49. Other instances of rats travelling from village to village and spreading infection have been given me by Mr. Vásudéva Rao (Tiruppattúr) and also in Vellore and Kurnool. Dr. Simond (pp. 640–41) gives a detailed account, on the authority of Mr. Hankin, of plague spreading from Hardwar to two successive neighbouring villages, rats in each case dying for three months before human mortality commenced. Instances of rats falling in villages as a preliminary to human infection or without human infection supervening have been given me at Ootacamund, Hosúr (Mr. Gilby) and Hospet (epidemics of 1903 and 1904); and Mr. Carr and Mr. Campbell both recall this as a feature of their Bellary experience. The Plague Narratives of Salem for January 1901, of Anantapur for 1902 and of the Nilgiris for November 1903 contain interesting and circumstantial accounts of similar events. Other officers merely express their opinion one way or the other. Colonel Smyth, Mr. Bardswell and Mr. Noyce think that rats would very rarely spread plague from village to village, but the general opinion is either neutral or to the contrary.

50. Considering that the action of rats in this respect can never be more than a matter of *inference*, it would be hardly reasonable to expect more evidence than that detailed above in support of the view that the action of rats in spreading plague from one village to another adjacent village is an influence that has to be definitely taken into account in regard to the ætiology of plague and can by no means be considered entirely negligible in comparison with that of man. Amongst the instances given, will be found some in which grain, rather than rats, was the source of conveyance of infection from village to village. The reference to grain was somewhat premature. Before entering further on the evidence in regard to grain as a conveyer of infection, a few words are necessary as to its power of *retaining* infection. The subject is dealt with on pages 2 and 3 of the Plague Inspector's Manual. Bacteriological experiments show that, in materials of most kinds and in gunny-bags, the infection disappears in six days, whilst in grain it lasts up to thirteen days. Some experiments made by Dr. Tidswell (Sidney Report, p. 67) give the period of infectivity as 15 days in the case of bran and rather less in the case of most other food-stuffs. Cloths retained the infection distinctly longer, on the whole, than they did in the experiments quoted in the Plague Inspector's Manual, muslin continuing

Grain as a retainer and conveyer of infection.

to retain the infection for 21 days. In practice, clothing has been found capable of retaining infection several weeks and, perhaps, even months, which seems to show that the bacteriological experiments cannot have correctly reproduced the natural conditions. Experiments (under apparently similar conditions) having shown that grain is capable of retaining infection for nearly double as long as clothing materials, it might have been imagined that something of the sort would be reproduced under natural conditions, but the number of towns which have escaped infection, in spite of grain supplied from infected sources, would seem to show that this reasoning cannot hold good. I am inclined to suspect that, in many of the cases in which clothing has been found in practice to retain infection longer than the bacteriological results would lead us to expect, dirt and contamination of the cloths must have been the cause. However, the importance of grain as a source of infection does not depend on its power of retaining infection for a long time together. It is as a centre of attraction for rats that it demands attention. Wherever there is infection among rats, grain-shops and granaries will necessarily be foci of infection, the grain continually receiving and transmitting infection. If any of the grain thus infected be transmitted to other villages, it will be a source of infection for at least 13 days and, I suspect, a far more dangerous source of infection than the human being, being much more likely to spread *immediate* infection amongst the rat-population. Similar associations would tend to explain why food-shops are frequently centres of contagion, sweetmeat sellers for example (paragraph 29 above). The infectivity of grain also seems to explain why syces are frequently attacked with plague as compared with Europeans and their other servants and why plague so frequently commences in the grain-bazaars of large towns.

51. Major Jennings states that the organism has been found in grain and merchandise and that its "importation from infected to uninfected places "should be looked upon as possessing a certain degree of ætiological significance," as it may be stored where rats can get at it: he observes, however, that its action in this respect is limited and that the proofs of the spread of the disease by this means are scanty and inconclusive. It is observed that the superior liability of traders to infection, if it exists, may be due to their shops attracting rats or to their travelling to infected places. The Plague Commissioners take much the same view and do not recommend any measures with regard to grain or gunny-bags or grain-shops, except the desiccation of the grain as a part of the ordinary process of disinfection. They adopt the same method of weighing evidence regarding grain as that adopted regarding rats (paragraph 41 above). A number of instances are given, however, in which infection in towns or villages has broken out for the first time in grain-shops or amongst dealers in grain. Colonel King thinks "that it would "be unwise to encourage import of grain from an indigenously affected locality to one "that is free of the disease in its immediate locality." As regards the disinfection of grain, he observes that, "where it is in small quantities and there is suspicion of "contamination by rats, it should be destroyed." This is a valuable rider to the recommendations of the Indian Plague Commission. He further notes that "mer- "chants receiving grain or goods from infected areas should be warned to be "particularly careful to watch for dead or sickly rats." I do not find any mention of grain or food-stuffs in his draft hand-bill (Jennings 32, 43, 44; Indian Plague Commission's Report, V, 104, 113, 140, 378; King's Plague Inspector's Manual, 20, 84; Municipal Manual, 3, 13, 14).

Instances of infection from grain.

52. A large number of cases were given me in which rats or the droppings or excreta of rats had been found in grain or gunny-bags; also several cases of the infection of villages by grain. An interesting case is given in paragraph 4 (3) of the Nilgiris Plague Narrative for November 1903, regarding the village of Kambatti, where "ragi brought from Ootacamund was stored and kept unspread in a "big basket for a long time. When the store was opened, a dead rat was found "therein and removed by the patient. The grain was afterwards used for con- "sumption, without any precaution having been taken to expose the grain to the "sun, and the first plague case was of an intestinal type." Surgeon-General Planck informed the Commissioners (p. 113) of a series of deaths from cooking and eating grain which had come from an infected village and had been stored for some time. It does not appear that in this case the type of plague was septicæmic.

Dr. Simond (p. 644) notes that grain-dealers furnished the greatest number of victims in Bombay, and that elsewhere infection originated in grain-shops. Mr. Vásudéva Rao gives two stories of infection by grain. The first is of a somewhat speculative nature, but the second (in connection with an outbreak in Alangáyam village) seems well authenticated. In this case, the grain had been stored for six months, after which it was opened and dead rats were found with attacks of plague as a sequel. In Kurnool, a story was told me of grain brought from an infected to an uninfected village, with the result that there was an outbreak of plague in the latter village. The Collector also gave a story of some thieves who stole infected grain and developed, plague. The outbreak of plague in Mangalore in 1902 was attributed to the importation of grain (or infected rats in grain) from Bombay (G.Os., Nos. 824, 824-A./P., dated 27th January 1902 and 900-P., dated 11th June 1902). The Rev. Mr. Chamberlain attributes the outbreak of the disease in Vellore last year to the grain in the market, which had been shut up and contained hundreds of dead rats. The grain-shops were all opened out by the authorities and the grain exposed to the sunlight. Uravakonda (Anantapur district), Vániyambádi (Salem district) and certain villages in the Bellary district and in the Hosúr division (*vide* the Hosúr Conference) are believed to have been infected by the importation of grain (*vide* also paragraph 47 above). An interesting story was told me in Guntakal (though the incident had occurred in Kollegal) of infection derived from some rats in a vegetable shop. This is one of the incidents alluded to at the end of paragraph 26 above, in proof of the proposition that dead rats require cautious handling. It is a well-authenticated case (*vide* the Guntakal Conference). Captain Niblock and Mr. Kidd gave some circumstantial stories of infection derived from grain in their evidence before the Plague Commission (page 104). In Salem and Bellary, old and empty gunny-bags have fallen under suspicion; the only cases, in which there was definite evidence of gunny-bags having caused plague, were given by Captain Anderson, in the Vellore Conference; in those cases, the infection arose from sleeping on the bags. It is very difficult, in many of these accounts, to separate off the part played by rats and grain, respectively, nor, having regard to the observations made in paragraph 50 above, does it seem necessary to do so, since rats and grain act by mutually infecting each other. Epidemics in Sidney and Johannesburg are believed to have originated in imported fodder. The enquiries made in Sidney were most careful and thorough, as may be seen from the report so frequently cited already (paragraphs 49–51 and 64). It seems difficult, in the face of this accumulation of evidence, to doubt that grain is highly infective and that it has frequently been the source of infection of particular towns and villages. It may be presumed that, in some of the cases in which rat-dropping preceded human mortality in villages (*vide* paragraph 49 above), grain was the means by which the rats reached the village.

Further evidence as to conveyance of infection from village to village by rats.

53. It will be observed that, in order to put the evidence regarding grain in a compact form, I have not confined myself to the case of importation from village to village, but have also given instances of its infectivity in general. Before concluding this discussion as to the agency of rats and rat-infected grain in conveying infection from village to village, I will submit one or two of the most striking instances from other countries and other parts of India, which have come to my notice. Perhaps, the most conclusive instance of the way in which rats can retain infection amongst themselves for some length of time and then transmit it to human beings is the case of the "SS. *Antillian*," recorded in the Sidney report (paragraphs 50–64). The evidence shows that the latest date on which this steamer could have become infected was 1st February 1902. There was some evidence to show that there were plague-rats on board, prior to 27th February 1902, on which date one of the hands contracted the disease, while the vessel was at sea. The case of the "SS. *Shannon*," a somewhat similar one (though the interval is not so long), is quoted by Dr. Simond (page 646) and the Indian Plague Commission (page 118). Another very interesting case from Sidney is that of the origin of a case of plague in Newcastle (N.S.W.). Sidney was infected at the time, and the patient, prior to getting the attack, had handled some dead rats in a cellar, which in its turn communicated, by means of a drain, with a wharf, where fodder from Sidney was stored. There were no further cases in the town (Sidney Report,

paragraphs 183–193). The British Medical Journal of 12th March 1904 contains some observations regarding rat-dropping prior to cases of human plague, as also the article in the Indian Medical Gazette for June 1904, already quoted.

Action of rats within infected villages.

54. Paragraphs 46–53 have been taken up with an analysis of whatever evidence I have been able to gather in regard to the agency of rats in spreading plague from village to village. Even if some of the instances given do not seem *conclusive* as regards the exact point at issue, they will at any rate serve to strengthen my case in regard to the agency of rats within the limits of infected villages and towns, which I now propose to discuss. Plainly, if the facts in regard to the infection of a particular town or village seem, in the first instance, to point exclusively to the agency of rats, the action of the rats *within* the village or town must be of pre-eminent importance, if it can serve to obscure and obliterate all trace of human importation of the disease, supposing that such human importation did actually take place. The first eleven paragraphs of this chapter are also relevant to this portion of the subject, as also those portions of this chapter (paragraphs 33–42) which deal with the opinion of authorities and the views held in countries other than India. Pages 146–148 of the Plague Commissioners' Report contain many cases in which there has been an interval between the arrival of an imported case of plague and the outbreak of an epidemic, though (in accordance with their general principle of weighing evidence) they refuse to accept the conclusion that it was bridged over by an epizoötic amongst rats, if any other hypothesis is *possible*. Some of the cases are, however, admitted to amount to a demonstration of the agency of rats in keeping alive infection. *Vide* also Part III (paragraph 27) of this report. So far as my own evidence is concerned, the difficulty lies in selection. I would first invoke the opinion of the administrators and experts consulted, which is unanimous in support of the theory that rats are a most important influence in causing epidemics. The people themselves, however, have constituted themselves into judges of this question, and their verdict is expressed in no doubtful terms.

Opinion of the people regarding carriage of infection by rats.

55. We have, in my respectful opinion, not very much to teach the people of India in regard to the broad and essential facts of ætiology: I should almost be inclined to say that we had something to learn from them. Evacuation (Part II, paragraph 9) is their grand remedy: is not their instinct justified by expert opinion? Disinfection by chemicals they look upon with something like amusement: can we affirm that it really does all that it is supposed to do? Of contact with sick *people* they have comparatively little fear: is it not the universal expert opinion that plague is only mildly infectious from person to person? Let rats die in their village and their terror knows no bounds: I submit that in this they pronounce a decisive judgment and an absolutely sound judgment as to the importance of the rat in the ætiology of plague (paragraph 11 above). It has been said that "*tout le monde*" is wiser than the wisest man. I cannot but think that a horde of half-naked coolies, scampering out of their village helter-skelter, because two or three dead rats have been found in a house, are nearer to the heart of the matter than the learned, who conceive that rats "cannot be considered to fall "short of" man in importance as a factor in spreading plague or who go so far as to complain of the "pernicious" rat-theory which diverts their attention from recondite and ingenious speculations.

56. I need hardly say that what I rely on is the popular *instinct* and not the popular *thought*. "The wearer knows where the shoe pinches," but Molière by no means intended to suggest that every man would be his own best shoe-maker. The instant we trust to thought instead of feeling, the danger of fallacy arises. This is not the place at which to discuss *in extenso* the popular attitude with regard to the whole question of rats and it will be sufficient, in illustration of my present point, to advert to the views of one or two witnesses, drawn from the classes which exercise most influence on popular opinion: thus, the head-master of the Madanapalle high-school finds rats to be "God's warning of the existence "or approach of disease" and a Catholic priest, writing from Mangalore, also considers rats a warning rather than a cause of the spread of plague. Similar views appear to be largely held by the thinking members of the Hindu community.

I wonder whether the enlightened gentlemen, who propound such theories, have ever considered how heavily the burden lies on them to ascertain and demonstrate the existence of that mysterious *cause* of which the rats are a *warning*. When a phenomenon (the eating of poison) invariably precedes another phenomenon (death), unless medicinal treatment is applied, logic and common-sense alike seem to forbid us to speak of the first phenomenon as a *warning* (divine or otherwise) of the second phenomenon, and we would be considered mad, if we deprecated the prohibition of the sale of (say) adulterated food on the ground that, without the symptoms of arsenical poisoning caused by eating it, the people would not be *warned* to have recourse to the doctor. The Chairman of the Tiruppattúr Municipality recognises this difficulty but boldly contends that "even if plague breaks "out successively in different quarters of a town and dead rats are found in the "different quarters, there must be an independent cause (apart from rats) for these "successive epidemics." In the first place, I would observe that such outbreaks will frequently be found to be concurrent and not successive: apart from this, when I search for the supposed independent cause, I fail to find it. Recrudescence might sometimes be held to account in part for the phenomenon, in the case of second and third epidemics (not in first epidemics, be it noted), but, so far as Mr. Ranganátha Mudaliyár's own town of Tiruppattúr is concerned, he has cut himself off from the application of the theory of recrudescence as an explanation by his candid avowal that "it is *not* his experience that plague breaks out in the same streets "or localities year after year." His own explanation appears to be that plague infection will come into being *spontaneously* under suitable conditions, and I really see no other alternative than this to the acceptance of the theory enunciated in paragraph 10 above. It seems scarcely necessary to add that the acceptance of the theory of a spontaneous appearance of the plague bacillus is wholly incompatible with the scientific view of the origin of the disease and with the general teaching of modern science. I may add, in order to relieve the last paragraph of all appearance of paradox, that, even where the instincts of the people seem to confirm the views of scientists, it by no means follows that their notions of prophylaxis will be either sound or adequate. It is quite conceivable (I am inclined to think it extremely likely) that many villagers would deliberately prefer to throw away their own lives and those of their neighbours, rather than have their home comforts or their caste prejudices disturbed: such an attitude obviously presents difficulties of a far greater and more enduring nature than would be presented by any mere differences of opinion on questions of fact.

Opinions of disinfecting officers on the spread of plague within villages through the agency of rats.

57. No witnesses are better entitled to be heard on the question of the influence of rats in the spread of epidemics than those who have been themselves engaged in disinfecting operations. I noted in Part IV (paragraph 13) the names of certain officers, whose notes contained many useful hints on disinfection: some officers have put their disinfecting notes in the narrative form: their experiences are of such value and interest and present such a vivid picture of the spread of an epidemic that I shall offer no excuse for embodying extracts from them in the text: their bearing on the subject now under discussion will be obvious. Mr. Richards writes thus: "I despair of ever controlling rats. They seem to breed at a rate "that compensates for their mortality, whatever it may be . . . . Rats have no "respect for caste or religion. But for rats, the Brahman would be safe from "infection, which had attacked the Sudra, the Muhammadan would be safe from "the Hindu . . . . In Vániyambádi . . . . rat-infection was traced to two "or three houses, which adjoined each other. One-hundred and eight houses in "a block were at once disinfected and the disease was stayed for some days. "The rats, however, migrated south, and dead rats and plague cases were detected "in the very house next to that at which disinfection had stopped. A further "block was disinfected. There was again a lull. Then new cases and more rat "corpses were discovered, once more next door to the last house disinfected. It "was interesting to note that not a single case was traceable to either of these "disinfected blocks *after* disinfection. The same sort of thing occurred in "Daulatábád and Krishnagiri in 1903. Block-wár evacuation and disinfection "would not keep pace with the rats . . . . Rats undoubtedly migrate and "carry infection with them. The intervention of a street is no safe-guard what-

"ever . . . . My experience in villages is the same as that in towns . . . . "Rat corpses are generally reported some days before there is any evidence that "plague is indigenous." So much for Salem: now let me quote Mr. Krishnamáchári's West Coast experiences. "Rats seem to spread plague from one locality "to another. As soon as a particular locality gets infected, rats leave it and "migrate to healthy localities. Some of these rats have probably taken infection "already, and hence it happens that, very soon afterwards, rats begin to die in "healthy localities adjoining infected areas. I also observe that, as soon as a "highly infected locality is evacuated, rats begin to die in localities adjoining. In "a few cases, there were actual cases of plague, a few days after death of rats was "reported. I observed the tendency, especially in those cases." The instances are to be found in the appendix. Lastly, I will take Mr. Graham's experiences in Madanapalle. "Judging from the number of dead plague rats found scattered "all over Madanapalle and throughout the plague-infected villages under my obser- "vation, it would seem as if rats exercised a spreading influence to a great extent ". . . . It is impossible to trace plague-stricken rats. Judging by the "curious way in which the cases occurred in Madanapalle, *i.e.*, the first two or "three cases all in the same place, then a case a street off, then a case two or three "streets away, then cases dotted here and there over the town, until finally every "part of the town was thoroughly infected, it would point to rats as the agents of "dissemination of infection. Another point is that where the town . . . . a "town of between ten and twenty thousand inhabitants . . . . , was being "disinfected, every house, in which a plague case had occurred, was found to be "full of dead plague rats, as many as 30 being found in one house. Whereas, "although dead rats were found in houses in which no plague had occurred, they "were only found singly or perhaps two or three in the house, and also every house, "which was found free from dead rats, had also been free from any infection." I may note that Madanapalle, Vániyambádi and Mangalore, broadly speaking, are representatives of the three tracts into which this Presidency might most conveniently be divided from a climatic point of view—The Carnatic, the Dekhan and the Malabar coast.

58. It will be observed that the rats in Madanapalle followed a very eccentric course. The same peculiarity struck Mr. Vásudéva Rao, in regard to Tiruppattúr. He says that it was the subject of much observation. Captain Gabbett has also been struck by the curious course of epidemics. "Why" he asks "does plague "leave one quarter and go to another in ever widening circles? Because all the "rats in an attacked quarter either die or migrate to another quarter. I have "noticed this." Thus, the influence of rats in the spread of the disease is also found to be paramount and noticeable in the peculiar climatic conditions of the Nilgiris. A gentleman in Bellary informed me of certain experiences of his own, which illustrate the method of action of rats in a very happy way (2nd Bellary Conference): "Mr. D.K. lived 250 yards away from an infected locality in "Bellary. Observed a dead rat 100 yards away from his bungalow: two or three "days later, he saw a dead rat 50 yards from his bungalow: two or three days later, "a dead rat was found close to his bungalow: he then left his house. A servant "who remained in the house got plague." Rats, however, seldom "show their "hand" to this extent. I have quoted Sir Patrick Manson's views on this point in paragraph 33 above. In the Indian Medical Gazette for June, we are told that, in the Amritsar district, in the great majority of cases, "infection could be traced to human "intercourse . . . . the next step was the infection and death of rats in the "infected and adjoining houses, followed by a rapid spread of the epidemic."

Further evidence on the point.

59. The Indian Plague Commission (pp. 124–127) received a considerable body of evidence to show the influence of rats in the spread of an epidemic, instances of rats dying in evacuated villages and re-infecting the inhabitants on their return and so forth. A good case of the converse kind is furnished me from Anantapur: "Rats came from Janatanahalli (an infected village) to the plague "camp one or two furlongs off. A house-rat was found dead in the camp. Disin- "fection was at once resorted to, but plague broke out in the camp a few days later. "It looked as if the rats were the cause of this." I cannot refrain from also

quoting the case of Banga, cited before the Plague Commission. It is interesting on many accounts, not least so because it includes an account of what may have been intended in part as an attempt to render a quarter of a town rat-proof. This method is alluded to by Sir Patrick Manson and was also adopted in Sidney in 1902. An iron fence was used in Johannesburg with considerable success (paragraph 35 above). The Banga case is as follows: "As soon as the first case was detected, "a brick wall, some eight feet high, was built across the street of the quarter "where the case occurred. The inhabitants of the quarter . . . . were taken "out through an opening specially made in the wall, a guard being placed on that "opening . . . . The people were taken some distance outside the wall, "and a cordon was placed round their camp. Seventeen days after this evacuation "had taken place (and at this date the evacuated people were quite free from "plague), three further cases of plague were discovered in two houses situated just "outside the evacuated quarter, one on either side of it. On the day on which "these two cases were detected, a dead rat was found in one of the houses in "question, and a day or two before a dead rat had been seen . . . . in "the evacuated quarter. On the discovery of these three cases, the 203 inhabit-"ants of the second quarter were evicted" with exactly similar precautions, but plague broke out again near the second quarter. A third quarter was then evicted. "After this third evacuation, there was another interval of nine days, during which "no plague cases occurred in the town. Two further cases were then found and "on the next day three more, two of them being in a house which a sick rat had "been seen to enter. After this, dead rats and plague cases were found all over "Banga and the town was completely evacuated." I apprehend that the evidence quoted is sufficient, without going into further details, to illustrate and support my position in regard to the action of rats within or close to the limits of towns and villages as conveyers and spreaders of infection. It seems fairly plain that, with this agency at work, little is left for human agency to effect in the way of spreading infection.

Summary.

60. I now proceed to summarize the facts discussed and the conclusions submitted in the present chapter. That rats can retain infection amongst themselves for at least three weeks is shown conclusively by the case of "S.S. *Antillian*" (paragraph 53): that they can retain it for a longer period is rendered probable by the Ilitorai case (paragraphs 44 and 45); that they can and frequently do transmit an epidemic for a distance of a mile or two is rendered certain by an accumulation of instances (paragraphs 46–49); that they can be and frequently are transported to far greater distances in grain is equally certain from the evidence adduced (paragraphs 50–52). It seems clear, therefore, that, even if for our passport system were substituted a rigid system of quarantine and detention of persons, it is neither impossible nor, I think, highly improbable that rats and grain should, none the less, gradually spread the epidemic all over India. That even now they do assist considerably in spreading it from one place to another there seems every reason to believe. It seems, therefore, clear that our passport-system, useful as it is within its own limits, is not by itself sufficient to save villages and towns from unexpected and unobserved invasions of the disease through the medium of rats or grain. Sir Patrick Manson, speaking of quarantine, remarks:—"Even if the introduction "of plague by man could be prevented in this way, it is difficult to see how its "introduction by rats could be effectually guarded against" (p. 256).

61. Within the limits of towns and villages, I have found that rats are an adequate cause for the epidemic form of plague (paragraphs 54–59) and that there is no other adequate cause assignable (paragraphs 1–11). As Captain Gabbett puts it, "no rats, no epidemic." In the course of the discussion of this topic, the experience of various officers in charge of disinfecting work both in this Presidency and elsewhere has been cited: their experiences illustrate and confirm the conclusion at which I arrived in paragraph 24 of Part III, as to the really weak points in our system of disinfection: they show that that conclusion is not simply academic but that it has practical and important consequences.

62. The most important question of all remains still untouched, namely whether it is possible for us to do more than we have done in regard to rats. This

I reserve for discussion in Part VII, the present chapter having already stretched to an inordinate length. That it is in the highest degree desirable that we should do all that is practicable to rid ourselves of this scourge is the practical conclusion which the evidence adduced in this chapter is intended to subserve: such a demonstration may possibly be deemed superfluous: but, having regard to the trend of authoritative opinion in this country, I hardly think so: my fear is lest, having regard to the difficulty of proving epidemiological facts in this country, it may not be considered complete and conclusive: whatever value my own personal convictions may have, I would throw them unreservedly into the scale; from whatever point of view the facts are approached, they seem to me to lead irresistibly to the practical conclusion that our present measures are only successful, in so far as they tend to limit epizoötic plague amongst rats, and that the complete destruction of rats in infected and threatened localities, if practicable, is the only course which seems to hold out any very strong hopes of the complete eradication of epidemic plague from this Presidency.

63. Throughout the chapter, I have endeavoured to test my conclusions by reference to authority (paragraphs 12–15, 33, 40–43) and to the practice of other countries, as far as information in the matter was available (paragraphs 34–39 and 53). The examples of Sidney, Capetown, Brisbane, Johannesburg and Russia, coupled with the pronounced views expressed by Sir Patrick Manson, are believed to lend a strong support to the opinions advocated in this chapter. The importance of other animals or insects in the transmission of infection has been discussed (paragraphs 16–31) and, in connection with this part of the subject, the rat-flea theory has been indicated (paragraphs 21–28, 32), and the discussion of all the theoretically possible cycles in the history of infection has thus been brought to an end.

PART VI.

INOCULATION.

Not much in vogue since 1898-99--Statistics tending to show the advantages of inoculation can seldom be accepted without reservations--The process has considerable efficacy as a personal prophylactic, but it cannot be considered as an efficient substitute or even as a very valuable supplement to the existing plague policy--Very unpopular: mostly resorted to under European influence or under stress of terror in the course of epidemics or (more rarely) for the sake of the privileges conferred--Risks and unpleasantnesses involved in the process—No extension of the measures now in force for promoting inoculation considered practicable or expedient—The privileges now conferred on inoculated persons may be reduced to four months; no privileges considered advisable, as regards those inoculated on the occasion of epidemics.

History of inoculation in this Presidency.

IN 1898-99, a wave of enthusiasm seems to have passed over this Presidency in the matter of inoculation, mainly due to the skilled and ardent advocacy of Colonel (then Major) W. B. Bannerman, I.M.S., ably seconded by the local Administrative and Medical Officers of the various infected and threatened districts. About 15,000 persons were then inoculated, 5,000 in Madras City and the rest in various up-country districts. There were many circumstances which assisted Colonel Bannerman's efforts: the horrors of the disease, the superficial analogies between the processes of inoculation and vaccination (giving the former much of the prestige attaching to the latter) and the favourable attitude assumed by the Indian Plague Commission. A volume of cold water was poured on this prophylactic ardour by Colonel Lawrie's evidence as to "putrescent broth" and so forth, and the seed of suspicion, thus sown in the breasts of the people, has never yet been completely eradicated. The immediate effect was a drop in the number of inoculated persons in the Presidency to about 1,400 in 1899-1900. Since then, inoculation has been resorted to in what I might perhaps describe as a sporadic fashion, sometimes coincidently with an outbreak in a new district, sometimes, perhaps, as the result of exceptional zeal on the part of particular officers. The figures which I have collected cannot pretend to completeness: such as they are, they will be found in Appendix VII. In the Salem district, inoculation has gone on steadily year by year at the Remount Depôt and nowhere else. In Bellary, there has been some inoculation every year, except apparently 1901, the total in 1902 rising to the figure of 5,000. When plague broke out in Coimbatore, some 1,300 people were inoculated, and about the same number in South Canara, at the time of the Mangalore epidemic. About 60 or 70 people were inoculated in and about Madanapalle this year and about 250 in and about Ootacamund. This exhausts the figures for this Presidency. In Bangalore Cantonment and the Kolar Gold Fields (in both of which stations, the Medical officers are strong believers in inoculation), the whole or the greater part of the operations performed were prior to 1900.

Position which it occupies among plague measures.

2. Inoculation occupies an exceptional position amongst plague measures in many respects: it is primarily a personal prophylactic and only secondarily and derivatively a measure in the interests of the community. It is, perhaps, the only plague measure which has been more largely resorted to in other Presidencies than in our own and, further, it is the only measure of which the entirely voluntary nature is emphasised in the strongest possible terms. It is emphatically a medical as opposed to a sanitary measure, and the methods of proselytism, by which alone its spread is permitted, will always appeal to a large proportion of the Medical profession, whose favourite weapon is not authority but reason.

3. I have been directed to report on the adequacy of the measures now in force for promoting the practice of inoculation. I venture to take this order in a broad sense. In other words, I shall endeavour to ascertain how far it is practicable and expedient to revive the popularity of this measure and extend its scope, which, so far as this Presidency is concerned, must be admitted to have sunk to a very low ebb. To arrive at any satisfactory conclusion on this point, it will be necessary not only to allude to popular feeling on the subject but also to subject the measure itself to a process of criticism and to try and ascertain its advantages and dangers. Then and only then can such proposals as occur to me or have been suggested by witnesses for enlarging the scope of the measure be adequately judged.

Measure of the advantages obtained from it.

4. The advantages of inoculation are sufficiently patent, though their exact measure and extent cannot yet be ascertained. It can hardly be pretended that they are comparable with those of vaccination either in regard to the absolute nature of the immunity conferred or in regard to the time during which the immunity lasts. The Indian Plague Commission, in their very judicial summing up of the case for inoculation, put prominently forward cases of "plague-attacked persons, "who had undergone inoculation as many as four times in the course of two years "previous to their attack." In 1899, I was myself unofficially informed by a Medical friend, whose duties had lain largely in the direction of inoculation in Bombay, that one of the last fatal cases of plague which he had attended in Bombay was that of a man who had been inoculated four times. None the less, the protection afforded, though relative, is real and substantial. The admirable account of the process contained in the Plague Inspector's Manual (pages 87–93) includes the only two simple and convincing tabular statements in regard to the advantages of inoculation which I have ever come across. The experiments are such as to eliminate those elements of uncertainty to which I shall allude lower down, the inoculated and uninoculated alike being exposed to the same conditions, and the results being capable of complete and accurate check. It may be noticed that the period of observation in one case extended to 42 days and in the other case to 66 days. In so far, therefore, as they are used to show the extent of immunity from the disease afforded to inoculated persons for six months (the officially recognised period), they are somewhat unduly favourable to the process. In so far as they tend to show that an inoculated person has a better chance of escaping with his life, if attacked, they may be taken almost without reserve. The first case (42 days) shows that, where one inoculated person will succumb to plague, 11 uninoculated persons will succumb: so far as attacks are concerned, the proportion is not quite 1 to 4. The second case (66 days) gives a proportion of a little over 1 to 2 in regard to attacks and a little under 1 to 4 in regard to deaths. It is significant that the degree of relative immunity should fall in a marked way between the 42nd and the 66th day, but the relative immunity still remains very marked and entirely justifies Colonel King's conclusion that "inocula- "tion presents a very valuable protection against attack; but, as a life-saving "agency, its position is of still greater importance. Statistics that are indubitable "go to show that, if an inoculated person be attacked, he has from 80 to 90 per cent. "better chances of recovery than an uninoculated person;" or, putting the same result in a slightly different form, a native of India, undergoing inoculation, has chances in his favour of escaping a fatal attack of plague which vary from 70 to 90 per cent., according to the period to which the immunity is taken to extend: the chances of escape from an attack vary from 50 to 75 per cent.

5. Sir Patrick Manson (page 259) describes the system as one "apparently "of real value both in reducing the number attacked with plague to the extent of "from 77 to 85 per cent. and also in diminishing the mortality of those attacked by "80 per cent.," in other words, in diminishing the chances of a fatal attack by about 94 per cent.; this is more favourable than the results obtained from Colonel King's tables, but, according to Mauritius statistics, as given by Sir Patrick Manson, the figure drops to less than 80 per cent., a figure more nearly approaching that deduced from Colonel King's tables. The Indian Plague Commission (page 262) decline to give any numerical expression of the degree of protection afforded, merely emphasising the general facts emphasised by the authorities quoted above. Major Jennings (page 178) speaks to the same effect, adding that, "in making "an analysis, it is impossible to totally eliminate possible sources of error, which "might vitiate the statistics."

Unreliability of statistics.

6. This criticism should certainly be remembered, whenever supporters or opponents of inoculation rely on statistics on anything like a large scale in support of their views. Such statistics, if drawn from a large proportion of the population, must include people who have been inoculated for very varying periods. Doubtless, by a complicated mathematical process, this source of error might be eliminated, but two permanent sources of error remain. In the first place, it is almost impossible to be sure (except in such cases as those taken by Colonel King,

which must necessarily be operative on a very small scale) that we really know *all* the cases of attack which supervene on a given series of inoculations. One motive for getting inoculated is the consequent immunity from the Passport Rules secured thereby, and this is a consideration which will weigh most with travellers, whose attacks and deaths must frequently pass unnoticed: the same argument applies to persons inoculated during an epidemic, who subsequently flee from the infected locality in many cases; in the second place, it may certainly be taken as a general rule, in estimating general inoculation statistics, that the persons operated upon are, as a whole, those who, for one reason or another, would be least likely to be attacked with plague in any case.

7. Thus, 300 people were inoculated at the Remount Depôt, Matigiri, and none of them got plague, but this has to be attributed, in part at any rate, to the excellent arrangements made by the Depôt authorities for keeping their employés out of danger (Salem Conference). The same reservation must, to a great extent, be made in regard to the Kolar figures, kindly supplied me by Dr. O'Donnell, though, even allowing for this, they afford a substantial argument in favour of the advantages of inoculation, when combined with first-rate sanitation. In Mangalore, the results are even more striking, but Father Müller (unconvinced as to the advantages of the process) asks "Whom does the plague usually attack and carry away? The "weak," he answers, "the starving, those whose system has been run down by "disease or vice and who live in an unhealthy locality. These people are too much "afraid to get inoculated. It is those who are in good health and good circum-"stances and living in healthy localities that get inoculated. Many of them do not "get plague, but the same holds good with those of the same standing who do not "get inoculated." Criticism also tends to sap the value of Captain Robb's statistics in regard to Coimbatore town, the flight of the people at the time of the epidemic being notorious. Captain Standage would certainly not contend for a moment that the three people, out of the 20,000 inoculated persons in Bangalore whom he knows to have contracted plague, represent the absolute total beyond all possibility of doubt: otherwise, we should arrive at the startling result that the immunity *from attacks* conferred by the process was more than 99½ per cent. and lasted over several years, a result which would astonish M. Haffkine himself. Such figures are a just argument in favour of the relative immunity claimed for the process and a warning of the extreme unreliability of all statistics that have not been collected under exceptionally favourable conditions.

Opinions of witnesses.

8. Father Rondy's experiences with his servants have been favourable, and Major Crawford and Mr. Graham find that the process confers a considerable degree of immunity on sepoys and coolies engaged in disinfecting operations, whilst Mr. Gilby and another Supervisor of the Salem district find that it made no difference in their mortality (*vide* the Ootacamund and the Hosúr Conferences). An extraneous advantage, emphasised by some witnesses, is the feeling of confidence and safety which the process confers on the subject. There is some evidence, alluded to by Major Jennings and also brought to my notice in the Kolar Conference, that inoculation produces good results on general health and is a specific for rheumatism and other disorders. It may occasionally have these effects. A few statistics have been shown me, tending to confirm the statement as to the relative mildness of attacks of plague amongst the inoculated, but this will hardly be denied by any one, and the statistics themselves are more relevant in another connection. For the rest, opinion differs widely as to the advantages of the process. The Kolar authorities have given considerable attention to it, but the opinion of the Madras and South Indian Railway Companies is that it is not worth the money, time and energy that its spread would require. Major Bonham-Carter says "I "discussed the question of pressing inoculation on the railway staff with the heads "of departments of the railway and the chief medical officer, but the conclusion "we came to was that, on our present knowledge, the protection afforded was not "sufficient to justify the railway in embarking on the expenditure, which would be "involved in any general system of inoculating the railway staff, even if it had "been possible to arrange for it, in view of the fact that each man must be off duty "two or three days." Dr. Gibson (the chief medical officer) has given an extremely

full note on the subject of inoculation, which shows that these conclusions were not arrived at without a full knowledge of all that could be said in favour of the process. Both the railways in question run through plague-infected localities (the Madras Railway in particular), and it is plain that a decision on this point was one of momentous practical importance. Humanity and self-interest alike would have induced the Railway authorities to give active support to any measure, which, in their opinion, afforded a sufficient degree of protection to their employés.

Duration of immunity conferred by inoculation.

9. As to the duration of the relative immunity, the figures are not very definite. The Indian Plague Commission and Major Jennings say that it certainly lasts for some considerable number of weeks and may last for a number of months. Sir Patrick Manson and Colonel King are silent on the point. Recent results in the Punjab appear to show that the protection lasts for more than four months (G.O., No. 641 P., dated 16th April 1904). I have alluded to Captain Standage's experience on the subject in paragraph 7 above. The *immediate* effect of inoculation is a much more difficult question. It will be discussed later on.

Percentage of immunity.

10. Taking the most reliable figures obtainable, it would appear that, for a period of six weeks, inoculation confers on its possessor a relative immunity of 75 per cent., that is to say, one person will be attacked among the inoculated, when four will be attacked among the uninoculated. In other words, the rate of attack, if the whole population in an infected area could be inoculated every six weeks, would be a quarter of what it is, and the death-rate one-tenth. Supposing the period to be raised to nine weeks, the death-rate would be one-quarter and the rate of attack would be halved. Now, a department framed on the model of the vaccination department, with qualified and highly-paid medical officers substituted for unqualified and low-paid vaccinators, might conceivably be organized on such a scale as to be able to inoculate the population of infected areas once in the year, supposing that the department were organised on a basis of *quasi*-compulsion. What measure of protection would be afforded by the yearly inoculation of the millions of people inhabiting infected districts or districts in imminent danger of infection cannot be said, but it must certainly be assumed that it would be very much smaller than the amount mentioned above, even if we do not take into account the fact that universal inoculation would embrace in the scope of its operation everybody, healthy or unhealthy, rich or poor, instead of being (as now) mainly confined to those who are in relatively good circumstances and likely on all grounds to be comparatively immune from the disease, whether inoculated or uninoculated. It seems abundantly clear that such a measure would be attended with a degree of expense, energy and difficulty that can only be characterised as appalling and, even so, there is nothing to show that its effect in mitigating the severity of an epidemic would be very great. To suppose that it would be a substitute for other measures in the direction of stamping out the disease or even that it would very materially aid other measures in this respect seems to me entirely against the weight of the evidence.

Practical value of inoculation as a prophylactic.

11. Inoculation must, therefore, as it seems to me, rank entirely as a measure of personal prophylaxis. There is, in my respectful opinion, exactly as much reason for pressing it on the people as there would be for pressing them to take chlorodyne or brandy, when attacked with cholera. There is, supposing either course practicable, less reason for pressing inoculation on the people than for pressing them to live clean and sanitary lives: for clean and sanitary living *would*, I believe, incidently have the effect of rendering the population practically immune to plague and would thereby stamp out plague in its epidemic form, whilst by inoculation in its present form we cannot possibly hope to do anything of the sort (*vide* paragraphs 49 and 51 of Part III). It will be observed that, in arriving at this conclusion, I have confined myself entirely to the brighter side of the picture. The direct arguments urged against inoculation have still to be met.

12. In regard to the views enunciated in the last paragraph, I can claim the support of authority. The Indian Plague Commission remark that "where it "is found that disinfection and evacuation are both impossible, there, in par- "ticular, we think that inoculation should be resorted to . . . . [It] could

"not extirpate plague by itself, because a number of people will get plague, in "spite of inoculation" (page 403). Major Jennings observes that "it saves "many lives during an epidemic; if applied on a large scale, [it] exerts a powerful "influence towards limiting [the] extent and duration [of an epidemic] by immuniz-"ing the people: it is, therefore, a most valuable adjunct to plague measures" (pages 180–1). Colonel King confutes again and again "the opinion held by "certain authorities that it is possible to lay aside all sanitary measures in favour "of this method of contending against the disease." In the Punjab, this method of exterminating the disease would appear to have been thought possible, but such is not the opinion of Captain Browning Smith, the writer of the article in the June number of the Indian Medical Gazette, from which I have already made more than one citation. "Years of experience in the Punjab" he says "have proved that the spread of plague cannot be stayed by disinfection; no "treatment is of any avail in the disease; it only remains therefore to save as many "lives as possible by inoculation." With the very modest function assigned here to inoculation as a plague measure it would be impossible to quarrel, but it is by no means certain that the writer's practical solution of the problem of plague is applicable to this Presidency.

13. We, in this Presidency, believe that our policy has also resulted in the saving of many lives, far more than any scheme of unaided inoculation could possibly have saved and, further, our measures have had the inestimable advantage of keeping the whole population in an attitude of resistance to the disease, however involuntarily or even unwillingly the attitude may sometimes have been assumed, and we would further contend that our measures have had the effect, so far, of materially curtailing its spread: twelve out of our twenty-two districts are still free from plague and there are only four of the infected districts in which it has really gained any very considerable foot-hold. The time scarcely seems to have come, when there is no choice for us, except the alternative of doing nothing or endeavouring to save as many lives as possible: it would clearly seem, therefore, that, if inoculation is to be pressed in this Presidency (which, it must be admitted, is at present not the case), it should be in accordance with Major Jennings's view that, if adopted on a large scale, it immunizes the portion of the community treated and thereby constitutes a valuable adjunct to plague measures. If this view is applicable to the Madras Presidency, it would seem to be our duty to bestir ourselves in the matter and avail ourselves of a weapon which has now been allowed to rust for many years.

Attitude of the people towards inoculation.

14. Before proceeding further, it is necessary to endeavour to arrive at some conclusion regarding the attitude of the people towards inoculation. One of the specific questions asked at all conferences was whether a campaign in favour of inoculation would have a chance of success and, with the exception of the Tahsildar of Gooty and a merchant of Bellary, all have replied in the negative. Mr. Sindigi Marisiddappa of Bellary thinks it would meet with considerable success, if the subject were exempted from the operations of all plague rules for life, and says that, on these terms, he would be willing to submit to the operation himself, and the Tahsildar of Gooty appears to be stirred by the reminiscence of how he worked under Mr. Macleod in 1898 and persuaded 200 or 300 persons (60 or 70 is the figure given in the Anantapur conference) to be inoculated. These exceptions are of the kind that prove a rule. The opinion held by the majority of the witnesses is based on the fact that the opposition stirred up by anything in the nature of proselytism would be extreme and would react most unfavourably on all our plague measures. Mr. Clegg, Captain Gabbett and others urge this objection very strongly. The Mulkowal disaster is still recent: at present, its details are only known to the educated classes, but, having regard to past experience, it is impossible to doubt that, if any attempts were made to bring moral pressure to bear on the people by the agency of Tahsildars, Chairmen, Village Munsifs and the like, the disaster (in a magnified and distorted form) would be retailed in every village. Even now and in spite of the fact that nothing in the nature of a campaign has been instituted recently (except perhaps in Cuddapah), a thousand absurd rumours are prevalent. In every case in which a person is inoculated

and develops plague within a few days, the attack is (and probably always will be) assumed to be the result of the process, an assertion which we may laugh at but cannot so easily disprove. People say that inoculation causes debility, shortens life, causes leprosy, brings out latent diseases, such as diabetes, brings plague, has a generally bad effect on the constitution and leads to a variety of other unpleasant consequences. They object to the painful nature of the process, they dislike being laid up for three days (sometimes more), they think the protection not lasting enough, they think that it is no real protection, they are too lazy to take the trouble to submit to the process, they think that it will be time enough to be inoculated when plague comes, they have a vague dread of the process, they think it will kill them. Amongst Europeans and educated natives, opinions are of course less irrational and vague, but the enthusiasts for the process within this Presidency could be counted, I am inclined to think, on the fingers of one hand. Many people would agree with Mr. Campbell's description of inoculation as a "loathsome operation", and the immediate unpleasantnesses, coupled with the doubtful and short-lived nature of the protection, afford grounds for objection, which it is impossible to wholly gainsay.

Popular reasons for submitting to inoculation.

15. In this connection, it will be well to note who are mostly inoculated and why. I find that, at the outbreak of a first epidemic in a new district, a certain number of people usually come forward. This is probably due to panic: there is an invariable falling off in succeeding years: for reasons which I will submit later on, an epidemic is the worst season for the commencement of operations of this kind, but it is represented that it would be very difficult to persuade people to be inoculated, *before* an epidemic broke out. In unaffected districts, the main object with which people submit to inoculation would seem to be the freedom from the passport rules obtained thereby. Mr. Brodie considers that not a single person would submit to the process if he did not get off the passport rules thereby. In Madras City, this motive operated for a little time, but, finding that the epidemic did not come and that their privileges lapsed every six months, the people ceased to care for the process. The importance attributed to the immunity from passport regulations has been repeatedly emphasised, but, even with this inducement, the results cannot be considered encouraging, and I doubt whether it has very much effect now-a-days in practice. The Rev. Father Houbaer was inoculated in order to escape surveillance on a voyage to Europe, but says that he would not go through the process again, as he had high fever after the operation and continued to have pains in his arm for a year. The example of Madras City shows that the motive is short-lived in unaffected localities, and the statistics show that it has but little effect in promoting re-inoculation in infected localities. Perhaps, a life-long immunity from plague rules might rouse some temporary enthusiasm for the process: this course is suggested by Mr. Macleod, as well as by the Bellary merchant mentioned in the last paragraph. Mr. Macleod's example seems to have had little influence this year, except on Government servants (Plague Narratives for February and June). Colonel Benson, writing of Mysore, speaks of inoculation as "practically dead" and the Collector of Dharwar (in a letter kindly forwarded to me by Mr. Cowie) observes that, in 1900, when there were plague rules in force, people would get inoculated to escape them, but that now they cannot be got to come forward in large numbers. In Ootacamund and Coimbatore, we find that those who came forward are mostly connected with Europeans in some way, and this criticism must also be applied to the inoculation statistics obtained in regard to Kolar and Matigiri. In Bellary, incessant efforts on the part of the authorities have produced results which compare favourably with the rest of the Presidency, but, even there, it is only a minute and negligible fraction of the population who take advantage of the process. I suspect that direct European influence (exerted on servants or dependents) will be found to prevail to some extent in almost all places where inoculation is in favour to any appreciable extent all the year round. In several of my conferences, I ascertained which of the gentlemen present had been inoculated and when. Fifty-seven had not been inoculated; out of 28 who had been inoculated, 10 certainly (and possibly some of the remaining 18) had not been inoculated since 1898–1899. The fact that so many Europeans do not care to submit to the process themselves, though they exercise a decided influence in this direction on their

dependents and employés (both of which circumstances are certainly noticeable deductions from my enquiries), is probably chiefly attributable to the prevalent belief (1) that the reaction is peculiarly severe in the case of Europeans and (2) that Europeans are specially insusceptible to plague and can take sufficient care of themselves in other ways, whether inoculated or not. The second reason is undoubtedly sound, and the first reason has facts in its support, though I have not seen any authoritative pronouncement on the accuracy of the fact or on the reason why the fact should be so. The generally unfavourable attitude, even of the medical profession, struck the Hon'ble Mr. Andrew. I may add that, in 1899, two medical officers strongly dissuaded me from undergoing the process, one of whom was actually on duty in Madras for the express purpose of performing inoculation on any person, European or Native, who might come to him for the purpose of being inoculated. In short, the general attitude of the enlightened portion of the community is one of indifference and the general attitude of the unenlightened is one of repulsion.

Direction in which present policy regarding inoculation may be extended.

16. Our present policy does not *necessarily* go further than having serum ready for use at various big towns and letting the people come for it, if they so desire, though in Madras and in the districts of the Nilgiris, Coimbatore, Bellary, Cuddapah and South Canara (and possibly in other districts also) efforts have undoubtedly been made from time to time to impress on the people the advantages of the process. There is, so far as I know, only one direction in which this policy can be extended, and that is in the direction of an organized campaign. Pressure might be brought to bear on the subordinate revenue officials; their hopes and fears might be appealed to, in order to induce them to secure subjects; special medical officers might be appointed and the services of Tahsildars and Municipal Chairmen put at their disposal; in short, a campaign might be undertaken on the lines of that organized in the Amritsar district and described by Captain Browning Smith in the Indian Medical Gazette for June 1904. One or two extracts from Captain Browning Smith's account of this campaign may be of interest: they will at least serve to show what fervent conviction is required to support the promoter of inoculation in his mission: "One . . . . rumour . . . . was that a fee "was to be charged for every person inoculated; inoculating officers had at times "to write a certificate that no fees would be charged, before any one would come "forward. Said they 'if a fee is not going to be collected, why are you so careful "'to write everyone's name, parentage and address in that book,' referring to the "Inoculation Register, and it must be admitted that it was not an easy question to "answer; for we could hardly explain that we were writing down their names "principally for the sake of verifying cases of plague among the inoculated!", and, again "Before I began, I gave them an account of . . . . the Mulkowal "incident . . . . but they said that they had seen for themselves the good "effect of inoculation and, the sooner I stopped talking and began working, the "better they would be pleased; I had soon finished the few doses I had with me, "and the genuineness of their feelings was evidenced by the reproaches of those who "had to go away unsatisfied, the reproaches of some of the women taking the form "of an abuse which was evidently heart-felt": as regards the agency which would be required, I quote a further extract: "If Government has any intention of con- "tinuing this inoculation scheme in a modified way next cold weather, I should "advise one inoculation officer for each Tehsil, with an able Senior Naib-Tehsildar, "having a good knowledge of the Tehsil in which he is to work, for each officer, or, "better still, the Tehsildar himself to be appointed executive plague officer for "his Tehsil, his ordinary work to be performed by a substitute. No preacher "would be required" (in addition, apparently, to the two on the staff for this district). It is very evident that anything in the nature of an inoculation Cruisade, on the model of that now in operation in the Punjab, would be a serious strain on the revenue and medical staff, as the staff would, I apprehend, have to work entirely independently of the ordinary Plague Staff. Ryots in this Presidency would not perhaps accost the inoculating officer with the frank brutality of the Punjabis mentioned above, but that the final result would be any more satisfactory in the long run I venture to doubt; having regard to the attitude of the people set forth in paragraphs 14 and 15. Mr. Giri Rao of Madanapalle would certainly wish that

inoculators should be "all things to all men." His opinion is that "free interviews "should be granted and any question should be answered, however foolish it may be, "for we are dealing with people who are ignorant of the benefits."

Probable effects of a general campaign in favour of inoculation.

17. I cannot altogether dismiss as chimerical the possibility of violent resistance to any "persuasion" on the part of the subordinate municipal or revenue staff, which might happen to approach too near compulsion. By confining his attention to villagers, the inoculating officer would doubtless minimize this risk: but villages seem to be the sphere in which our present plague operations work most effectually and successfully. It is the big towns, where, if anywhere, the work of the inoculator would be welcome as an adjunct; but, in big towns, the chance of a sudden riot always exists: the Conjeeveram riot of 1899 is an instance of the danger of too great zeal in the cause of inoculation; there are many towns which contain far more dangerous and inflammatory elements than Conjeeveram, and a process in regard to which the people of this country have to be *persuaded* seems to have a tendency to arouse the worst side of their character. Further, I cannot but share the apprehensions of various officers, who think that any campaign in favour of inoculation would re-act very seriously on the temper in which the people submit to our present Plague Regulations: if the staffs were in any degree identical, I greatly fear that the working of any Plague Regulations whatever would become a matter of extreme difficulty. In forming this opinion, I rely partly on the opinions of the various officers consulted and partly on the probabilities of the case. A plague officer, entering a village with the object of enforcing measures of disinfection and evacuation, has a delicate and disagreeable duty in front of him, but the measures are at least familiar to the people by now (Part IV, paragraph 47): if the plague officer were also suspected to have any connection with inoculation, suspicion and resentment would, I fear, take the place of resignation: further, it would be difficult for the villagers to be made to understand that part of his mission rested on a voluntary basis and part of it on a basis of compulsion: in many towns, I venture to predict that the position of a plague officer, who was suspected of having any designs in the direction of inoculation in addition to the intention of enforcing sanitary measures, would be one of considerable personal danger.

Undesirability of making inoculation compulsory on Government servants.

18. Some of the witnesses examined have suggested the desirability of making inoculation compulsory on all Government servants (European or Native), whose duties lay in plague-infected localities. This would no doubt remove some difficulties from an inoculation campaign based on persuasion, but some serious objections to such a step present themselves to my mind. In the first place, I am inclined to think, on general principles, that a *personal* prophylactic should be open to everybody but compulsory on nobody: where it is a question of advantage *to the community as a whole*, compulsion may no doubt be legitimately resorted to: if, for example, the evidence showed that inoculation could, under any circumstances, seriously affect the course of plague as an epidemic, I should feel that one element at least was present, which would justify me in recommending that the process be made compulsory for everybody—official or non-official—but I have endeavoured, in paragraphs 4–11 of this chapter, to show that any such position in regard to inoculation is untenable. Vaccination is a definite protection against *epidemic* small-pox, is admitted by practically all competent authorities to be a highly successful method of treatment, is attended with little unpleasantness and practically no risk and has not got to be indefinitely repeated. Undoubted as are the advantages of inoculation, it will, I think, be conceded that there is no method of comparison between inoculation and vaccination which will not turn out decidedly to the disadvantage of inoculation. Further, apart from the unfortunate Mulkowal incident, there are features in connection with inoculation, which might, I apprehend, make Government hesitate to assume the responsibility of making such a process compulsory on any of its officers.

Risks involved in the operation.

19. The composition of the fluid (Jennings, 174) is certainly not pleasant reading and its appearance has been described to me in language of much the same kind as Colonel Lawrie's, but these are matters of less importance than the difficulty of standardizing it (pages 177–8), which tends either to cause "unnecessary suffering" or insufficient protection. The painful nature of the

operation, the high fever supervening, the necessity for repetitions of the process at frequent and uncertain intervals and the incomplete nature of the protection afforded are all arguments against the process which cannot be wholly ignored. Again, care in the preparation of the serum and care in its application are admittedly essential, if the result is to be satisfactory, and the absence of care in either particular may lead to very serious consequences. Mulkowal is only an extreme instance of untoward results which have been poured into my ears in the course of my tour. Again, the constitution of the subject should be carefully diagnosed, before the operation is performed. Colonel Smyth observes that a full dose should not be given to a man with diabetes. Father Rondy informed me that popular opinion attributed the death of the Coimbatore Treasury Deputy Collector to diabetes supervening on inoculation. There are risks of miscarriage attendant on the process (Vellore Conference). The Rev. Mr. Chamberlain has noticed that it affects people's weak points. There are risks of paralysis of the arm and the wrist, impairing of the sight and hearing, indolent ulcers (lasting for as long as 11 months in one case), more or less permanent pain in the arm, rheumatism, violent and almost fatal reactions, asthma, general impairing of the constitution and extreme weakness (*vide* the evidence of Colonel Smyth, Mr. Robertson and the Rev. Father Müller, as also the conferences held at Hospet, Bellary, Trichinopoly and Vellore). Apparently, these bad effects are mainly attributable to carelessness in some shape or form, but due care can by no means always be predicated as certain, as is sufficiently proved by the number of instances of ill-effects, of which I have been credibly informed. Such instances go far to explain (though they by no means wholly justify) the popular aversion to the process. It is apparent that the chances of undue haste and carelessness and failure to thoroughly diagnose the constitution of the subject would be multiplied, if the operation had to be performed on a really large scale. Again, Major Birdwood attaches great importance to the subjects being carefully looked after by a medical man *after* the operation: this cannot always be ensured. It seems a question how far it would be expedient to subject any person, official or non-official, against his will to a succession of unquestionably unpleasant experiences, coupled with possible risks to health or life, if he preferred to take his chance of contracting plague in the course of his duties.

20. It has been contended that every Government servant should be inoculated, in order to set an example to others. I submit that, if an officer, after weighing the question from all sides, believes in the advantages of inoculation, he will undergo the process for his own sake, and I am not clear why he should set an example to others in favour of the process, if he does *not* believe in it himself.

Necessity for employing skilled operators.

21. There is a practically universal consensus of opinion as to the importance of only allowing picked men to perform the operation. The present rule limits the performance of the operation to selected Civil Apothecaries and the higher grades of the Medical Service (G.O., No. 1548 P., dated 8th December 1898), and the numerous instances of bad effects following on the process would seem to indicate that the selection of Civil Apothecaries should, if anything, be more limited than it is now. This, however, is a matter for the consideration of the District Medical Officers themselves. No rules can be laid down as to principles of selection, and it is certain that some Civil Apothecaries do the work very well. Nothing is required but care and cleanliness and careful attention to antiseptic precautions (Kolar Conference). Mr. Brodie considers that every operator should have some training: it would certainly seem desirable that, before performing the operation on his own account, he should have had the opportunity of seeing it performed by an experienced man. Any considerable extension in the scope of the measure would clearly necessitate the employment of a largely increased staff of medical officers of high grade, so that, as a wholesale remedy against plague or even as a widely extended agency for saving individual lives, inoculation would be by no means economical. If the operation were to be carried on on a large scale, systematic provision for the inoculation of females might become necessary (G.O., No. 1542 P., Mis., dated 8th December 1898).

Summary.

22. Considering (1) that inoculation is not a measure by which plague can ever be deprived of its epidemic character (paragraphs 10 to 13 and paragraph 18

above), (2) that the protection conferred on the individual is neither certain nor lasting (paragraphs 4 to 9), (3) that there are decided risks and unpleasantnesses involved in the process (paragraph 19), (4) that it is most unpopular (paragraph 1 and paragraphs 14 to 17), (5) that any attempts in the direction of a campaign in favour of inoculation would be likely to re-act unfavourably on our present plague measures (paragraph 17) (6) and would be very expensive (paragraphs 10 and 21) and (7) that, under existing arrangements, anybody who wishes to avail himself of its undoubted advantages is at liberty to do so (paragraph 16), I am respectfully of opinion that the medical officers of the various infected and threatened districts can do (and, to the best of my belief, are doing) all that can legitimately be done towards popularizing the measure and that no further action is called for. I am strongly disposed to think that, if any general and systematic interference were made obligatory on the Revenue authorities, such a step would be likely to lead to untoward results and would, in all probability, have a very unfavourable effect on our plague policy as a whole. There seems no objection whatever to *individual* Revenue officers helping to popularize the measure, if their convictions lead them to do so, provided that their action is accompanied by no undue pressure on their subordinates and does not re-act unfavourably on the ordinary plague administration. Inoculation being a strictly medical measure (paragraph 2), the attitude which I would respectfully suggest as an adequate and desirable one for the Revenue Department as a whole is one of sympathetic neutrality. Anything in the nature of open or covert *opposition* to the measure on the part of Revenue subordinates would of course be a breach of discipline and punishable as such.

Question of inoculating persons incubating for plague.

23. One or two points have been raised on technical questions, such as the proper method of sterilizing the needle. These are beyond my powers of discussion, as also the question whether the inoculation of a person who may happen to be incubating for plague is or is not a beneficial process. Different medical officers have given different opinions. The figures furnished by Captain Robb in Coimbatore and by Mr. Xavier in Adóni seem to show that the rate of mortality, in the case of inoculated persons incubating for plague at the time of inoculation, is less than the ordinary rate of plague mortality. Captain Standage has given what seems, in my humble opinion, to be a very luminous statement of the problem at issue, but the matter seems to require further investigation: in any case, it is certain that nothing tends more to the unpopularity of the process than the occurrence of deaths from plague within a short interval of inoculation. This is an almost inevitable sequence of inoculation during epidemics and has been so proved in innumerable instances (*vide* Father Rondy's and Mr. Krishnaswámi Aiyar's evidence and the Kolar, Hospet, Vellore, first Trichinopoly and Kurnool Conferences). The remarks of Mr. Dutt, Major Ffrench and Dr. Elliott sufficiently show what a serious aspect this question may sometimes assume. Major Ffrench and Mr. Krishnaswámi Aiyar consider it dangerous to inoculate at all during an epidemic and most of the witnesses deprecate the inoculation of "contacts". It might, perhaps, seem inhuman to refuse to perform the operation, at the time when the fears of the people make them seek most eagerly for it. The inoculation of the "contacts" of plague patients is no doubt peculiarly likely to lead to a series of cases of plague among the recently inoculated and thereby seriously impair the popularity of the process, but in practice it is not always easy to know which are "contacts" and which are not. After all, I fear that it is hopeless to expect that inoculation will, in any case, become popular for a long time to come and I think the figures alluded to above justify me in reporting that the inoculation of "contacts" is, at any rate, not likely to do them serious harm. On the other hand, the bad effect produced by the death of contacts on the popular mind can probably be counterbalanced, in part, by a clear explanation on the part of the inoculating officer. I should, therefore, recommend (though with considerable diffidence), not that "contacts" should be refused inoculation, but that the inoculator, when inoculating in the course of epidemics, should explain to the subjects and bystanders that a person incubating for plague gets no immunity from an attack through inoculation and that it is therefore by no means unlikely that some of the persons then undergoing the operation will show symptoms of the disease within a few days. I would deprecate any such concealment of possible eventualities as, judging from the first extract given from Captain Browning Smith's report

(paragraph 16 above), the authorities seem to find advisable in the Punjab. If it be considered that such an explanation as is suggested above would be undesirable. I would suggest, as an alternative, that *known* "contacts" be refused the operation, Undoubtedly, it would be far better, both for the people and for the ultimate popularity of the process, if inoculation could be performed in the hot weather in affected and threatened localities rather than at the time of the epidemic, but it is hopeless to expect the people to look at it in this way, and the alternative seems, in the vast majority of cases, to lie between inoculation during epidemics or no inoculation at all. The desirability of securing the advantages of inoculation in the season when plague is quiescent might well be explained, in the pamphlet suggested in Part III, paragraph 51. Colonel King's statistics also seem sufficiently simple to be appreciated by at least a small proportion of the villagers. The general principles enunciated in this paragraph are to some extent recognized in paragraph 13 of Appendix I (5) of the Madras Plague Regulations in force outside the Presidency Town (page 56), but the instructions given in paragraph 74, Part IV, (page 26) of the same volume might appear to support the view that inoculation *during epidemics* is specially desirable.

Modifications of privileges now granted to inoculated persons.

24. It only remains to consider whether the privileges now conferred on inoculated persons require any modifications in the direction of extension or curtailment and whether any other changes in the rules are called for with reference to the views and facts elicited by my enquiry. I have already noted (paragraph 15 above) the suggestion that the privileges conferred on an inoculated person should last during his life-time. The decision of this point depends on the decision of the question whether it is considered that inoculation is so valuable a measure that, for the sake of popularizing it, it is desirable to subject the community to a perpetual risk of infection at the hands of any person who may have been inoculated at any period of his life. This is apparently not the view now held by Government. The reason for which the period of six months has been fixed would seem to be based on the consideration that the inoculated individual is, during that period, harmless (or nearly harmless) to the community. I do not find anything in my report on inoculation, which could be put forward as a ground for suggesting any change in the general point of view which Government has up to now been pleased to assume in this matter and am certainly not in favour of any extension of the privileges now enjoyed by holders of inoculation certificates, and on this point I am supported by the views of the overwhelming majority of the witnesses examined. If the principle which I respectfully presume to have actuated Government in the framing of the existing regulations be adhered to, it would seem as if the period during which the privileges stand good required curtailment rather than enhancement, as there seems no reliable evidence to show that the period of immunity extends to any definite time beyond four months (*vide* paragraph 9 above). Colonel King's statistics (paragraph 4) tend to show that there is a rapid decrease in the extent of the immunity conferred, commencing as early as the second month after the process. Four months rather than six would seem to be the period for which the privilege should be allowed, having regard to expert opinion and the conclusions drawn from experience.

Advisability of imposing further restrictions.

25. The imposition of further *restrictions* on the privileges conferred by inoculation would seem to be a measure so violently opposed to authority and practice that I submit my views on the matter with the greatest hesitation, but I apprehend that I shall be failing in my duty, if I leave unspoken any conclusions on matters of fundamental importance, to which my enquiries have led me. I trust that the necessity for endeavouring to justify them in every possible way may be some excuse for any prolixity of which I may be guilty. I have endeavoured to show that inoculation, however valuable it may be as a prophylactic for the individual, has not (and cannot be expected in the near future to have) any significance as regards the community. I would request that it be noted that this conclusion was arrived at wholly with reference to the abstract merits of the process itself: universal popularity, even if it were possible to secure it (which I see no reason to believe), could never increase the immunity conferred by the process itself. Improvements in this direction can only come from science and, considering the

almost undivided attention given to this remedy by *all* the officially recognized agencies in India which have been engaged for the last six years in investigating the scientific side of the problem of plague and considering the fact that they have hitherto failed to effect any improvement whatever, of which I am aware, in the duration or extent of the immunity conferred or in the safety or comfort of the process itself (*vide* paragraphs 9 and 19 above), I think that it may be confidently asserted that no improvement is to be expected in any of these respects in the near future. I would express a hope that, in the future, the attention of Indian Medical Specialists will cease to be exclusively occupied with inoculation, as, in my respectful opinion, there are many other scientific points of extreme importance in connection with plague, which urgently require bacteriological research and would turn to a very useful and practical purpose those energies which seem hitherto to have been concentrated on the preparation of prophylactic serum. This matter is alluded to at the end of Part VII. Meanwhile, I see no reason why inoculation should not be indefinitely relegated to the position of a personal prophylactic and occupy (as suggested in paragraph 11 above) the same position as a personal specific for cholera or for any other disease.

Official encouragement of inoculation not advisable.

26. If this view be accepted, I am unable to find any reason why Government should run any risk (that the concessions now granted to the inoculated *do* involve a considerable risk I shall endeavour to show, before completing this chapter) with the object of encouraging individuals to adopt this particular specific, in addition to the inducements which their own judgement, the advice of their friends and the natural desire of self-protection will hold out to them. The circulation of simply-worded pamphlets, in order to ensure the fact that every man should know the advantages of the process, if he chooses, would, no doubt, form an useful supplement, but to offer extraneous inducements in such a case seems opposed to the policy which ordinarily actuates Government in matters medical. There are few departments of medicine, in which it is not fairly certain that the adoption of European methods of treatment by the Native community at large would save thousands of lives yearly: but the policy adopted is to place what are believed to be sound remedies within the reach of everyone, leaving the community to find out their advantages by experience and the lapse of time. I venture to submit that, both in theory and practice, this is a sound policy and that any general attempt to use persuasion or to hold out inducements of an extraneous nature in regard to ordinary medical matters would have the effect of implanting in the Native community exactly those feelings of distrust and dislike with regard to European medical treatment in general with which Natives, as a whole, now regard inoculation. Vaccination, doubtless, offers an exception to this policy, but vaccination, as I have endeavoured to show, has exactly the element of *general prophylaxis* which inoculation lacks: in any case, we have treated vaccination as a measure of general sanitation and made it practically as much compulsory for a father to have his child vaccinated as it is for a house-holder to keep his drains in proper order. This is of course a *conceivable* policy in regard to inoculation, and I apprehend that the reason why Government would hesitate to adopt it in the case of inoculation is not so much on account of the state of popular opinion on the subject as because of the comparative inadequacy of the remedy itself. Meanwhile, the present policy in regard to inoculation seems to have neither the advantages of an appeal to the unbiassed judgement of the community nor those attendant on a recourse to the weight of authority.

Opinions of witnesses.

27. If, as I venture to think, the present rules in regard to inoculation tend to arouse a feeling of distrust and thereby in some degree to defeat their own object, this by itself would seem to be something of an argument against their continuance; nor am I altogether unsupported by the evidence of others as regards this view. Mr. Macleod, Mr. Cowie and Mr. Rámachandra Rao (Collector of Kurnool) have, in fact, gone further than I would go in this direction and suggest that a fee be charged for inoculation. Mr. Rámachandra Rao urges that "people believe in "what they have to pay for," Mr. Cowie argues that it would "put matters on "a proper footing" and Mr. Macleod urges that "no one pays money without "expected benefit." Taking the analogy of our general medical policy (which is free to all), I am not prepared to support this suggestion, having regard also to

the fact that it is not a question of *creating* an inoculation policy but of deciding what modifications in the existing policy seem called for, but I claim the support of the arguments advanced by these gentlemen for my own views, inasmuch as the withdrawal of inducements is clearly a less drastic measure than the imposition of penalties. Bellary is one of the most important districts in the Presidency from a plague point of view and also a district where inoculation has been pushed with especial vigour, and the official conference at Bellary is in favour of withdrawal of privileges: so are Mr. Robertson, Mr. Chalke, Mr. Ranganátha Mudaliyár and (the late) Mr. Annaswámi Mudaliyár. As regards the withdrawal of privileges from "contacts", I have the support of a large number of conferences and individual witnesses: the opinion that "contacts" do not become harmless to their neighbours, simply by reason of inoculation, is practically unanimous.

Argument for rescinding of all privileges conferred on persons inoculated during an epidemic.

28. This leads me to the more important branch of my argument. If there is reason to suspect that inoculation does not render the subject harmless to his neighbours, the positive arguments in support of the present rules seem to lose most of their value, especially if the effect of the present exemptions is as equivocal as is suggested in paragraphs 26 and 27. I endeavoured, in the earlier portion of Part V, to show that human beings, as such, were not in any case highly infective, but, from paragraphs 23 to 25 of Part III, it would appear that wearing apparel and personal effects constitute an important link between personal infection and rat-infection (that is, epidemicity). Inoculated "contacts" (who, be it remembered, are expressly advised, in paragraph 12 of Appendix I (5) of the Plague Regulations, to change their quarters) do not, as all my witnesses remark, cease to be infectious in regard to their cloths and personal effects and, whereas ordinary travellers from infected localities are at least under observation, exemption from this liability is one of the chief advantages now held out to the inoculated. They can thus spread infection unobserved and in a very insidious form. Doubtless, they "*may* be "required to be inspected at their own residence and shall, *when required*, give "their names and addresses," but it is highly unlikely that such a step is frequently taken, and I have no evidence of it. If such a step were frequently taken by the subordinate plague staff, the privileges conferred by inoculation would become almost nominal. That "contacts" constitute a large proportion of the subjects who submit themselves for inoculation seems highly probable. The panic caused by an epidemic is, as shown by the statistics, one of the most important of the motives for inoculation (*vide* paragraphs 1 and 15 above), and the persons who are most likely to be seized with panic are those who realize that they have been in recent contact with infection in some shape or form. It would seem clearly desirable that "contacts", who are known to be such, should be deprived of the privileges now conferred by inoculation. It is, in my respectful opinion, useless to leave any discretion in the hands of Plague Inspectors as to how to treat the inoculated "contacts." Discretion spells extortion, venality, inefficiency. The bulk of the witnesses consulted are of opinion that "contacts" should not be allowed any privileges by means of inoculation and, as I have already endeavoured to show, it is by no means *certain* that their inoculation should be even permitted.

29. Personally, I am disposed, in the existing state of the facts, to press the argument further. Inoculation, in almost every district except Bellary, is not sought for, except at the time of epidemics, and the number of "contacts" who seek inoculation must be far greater than those who are known to be such. How, in fact, is this to be found out? The subject is not going to confess that he has been in contact with a plague case, especially if the rules are altered so as to deprive "contacts" of privileges and, unless he is living in the same house with a plague patient, his denial must, as a rule, be accepted. It is impossible, at the time of an epidemic, to tell who is sickening for plague and where infection is incubating. Every man is suspect, whether he knows it himself or not. These considerations seem to constitute a strong argument for the general rescinding of privileges now granted to *all* inoculated persons at the time of an epidemic. The continuance of the privileges in favour of persons inoculated at other times and places would involve little risk, would be a convenience to travellers and would serve as a species of official indication of the desirability of not postponing the measure until

Advisability of restricting period of privileges in the case of other inoculated persons to four months

plague actually broke out. The considerations advanced in paragraph 24 suggest that the duration of these privileges should be reduced to four months.

30. That my apprehensions in regard to the possible spreading of plague by inoculated persons are not merely fanciful is sufficiently shown by the note appended to the form of exemption certificate (Plague Regulations, 67), wherein it is expressly stated that the certificate "does not exempt . . . . the holder ". . . . from liability . . . . to have his clothes disinfected when travel- "ling." This seems to give authoritative support to my apprehension that the inoculated person is a source of infection in the manner indicated above, but does not serve in the least to remove the cause of apprehension, since it is ruled in the most positive manner on page 59 of the Regulations that "disinfection of personal "effects should not be attempted in the case of travellers by road or railway." Exception (*b*) to this rule mentions "contacts", but these are the contacts of plague cases first discovered in a train: the other exceptions are obviously irrelevant to the question under discussion.

PART VII.

Plague Camps—Summary.

Unpopularity of plague hospitals: the alleged high rate of mortality in hospitals not borne out by figures—Their remoteness: the seclusion of the patient: prejudice caused thereby—Suggestions as to improvement in the type of building now in vogue and as to inspection and supervision by officials and non-officials: importance of the character of the officer in charge—Failure of most private hospitals: uselessness of most of the native unqualified doctors—Criticisms of the existing methods for the destruction of rats (1) advice, (2) rewards and (3) use of tar and sulphuric acid—Advantages and limitations of the use of traps and of the ordinary commercial poisons—Measures suggested for inspection and disinfection of grain travelling by rail or road: their limitations—Summary, as regards the advantages and limitations of the remedial measures (1) now in force, (2) proposed in this report—Dr. Danysz's method described—Need for bacteriological research in regard to the ætiology of plague.

Plague camps should be at a reasonable distance from the infected village.

Evacuation, as far as practicable, being an essential part of the plague policy of the Presidency (Part II, paragraphs 9 and 10), the arrangements by which patients and villagers should find temporary accommodation form an important part of plague administration. I have not been specially directed to offer any observations on these matters and, so far as evacuation is concerned, there are no very general or wide-spread complaints. Big towns always require careful and delicate handling: such general remarks as seem called for in that connection will fall into their places in the attempt made at the end of this chapter to deal with our plague policy as a whole (*vide* paragraphs 36 and 37 below). So far as plague camps in general are concerned, the only remark that suggests itself to me is that the great danger lies in the possible infection of the camps by means of rats from the infected village. This is an argument in favour of locating the camp at a reasonable distance from the infected portion of the village site.

Necessity for plague hospitals, though unpopular.

2. Plague hospitals, from the earliest days of the epidemic, have been a cause of dread and horror to the population at large, and no detail of our policy (with the possible exception of inoculation) has furnished wicked persons with so many opportunities of disseminating calumnies and exaggerations to the prejudice of the administration. The impressions thus created in the minds of the ignorant and the foolish cannot, I fear, be expected to disappear for some time to come and the unpopularity resulting therefrom has always reacted and must continue to react on our plague policy as a whole. None the less, the only alternative (home-segregation of patients) offers conditions which are fatal to disinfection (Part III, paragraph 20 and paragraph 37 of this chapter), in so much that, if our plague policy is to be maintained at all, paragraph 78 of the Mufassal Plague Regulations sets forth the essential minimum within which the enforcement of the removal of plague patients to hospitals must continue. Feeling strongly the inconvenience and danger attendant on a measure, which is at the same time an essential feature of our policy and a cause of violent unpopularity, I have endeavoured to ascertain, firstly, how far the grievances of the people are real or imaginary and, secondly, how far such grievances as are real are capable of rectification, having regard firstly to the necessity for keeping the system as a real and not a nominal check on the spread of infection and secondly to the limits imposed by considerations of practicability and economy.

Alternative of home segregation impracticable.

3. Paragraph 79 of the Mufassal Plague Regulations enjoins upon local authorities (amongst other remedies for ameliorating the hardships of the people in this connection) that every encouragement be given for the construction of private and caste hospitals and that patients in Government hospitals be allowed their own food and medicines. Though native doctors are not expressly mentioned, they are clearly included in the comprehensive permission given in regard to patients receiving "visits from their relations, friends and religious instructors." I have endeavoured to ascertain how far these concessions have been taken advantage of by those for whose benefit they have been made and what influence they have on the popularity and efficiency of the whole system.

4. Numerous and diversified as the complaints are which centre in plague hospitals, no form of complaint is so universal as that which regards them as death-traps: the belief of many of the vulgar (doubtless sincere) is that their relatives are taken to the camps to be killed and that the medicines are poisons: what object is supposed to incite a Government, admitted by the humblest and most ignorant to be benevolent in its general intentions, to the commission of these atrocities, I have not been able to ascertain: but the feeling is still very general and is by no means wholly eradicated by the re-appearance of patients alive and well and perfectly contented with their fate after a prolonged sojourn in the plague hospital. My experience in Conjeeveram in 1899 furnished me with an example of the ease with which such inconvenient facts can be eluded. The first occupant of my hospital was the woman detected in the manner described in paragraph 5, Part V. It was a typical case of bubonic plague and the cure took six weeks. Popular rumour, after first giving the woman over for lost, ended by denying that the case has ever been one of plague. The inhabitants of Conjeeveram are by no means an especially unreasonable people: I feel little hope, therefore, that the statistics, which I propose to quote, would in the least affect the popular view, however widely they might be known: but it is at least well that educated Hindus (who are by no means exempt from a modified share in the suspicions of the vulgar) should be shown that plague hospitals are as innocuous to patients as they admittedly are to attendants (Part III, paragraph 19). Popular opinion of plague hospitals.

5. The ordinary mortality in plague is given in Sir Patrick Manson's book (page 250) as "77 per cent. among the Indians" (it is interesting to note that the mortality varies from 93·4 per cent. amongst Chinese to 18·2 per cent. amongst Europeans). The figures given for bubonic plague in Major Jennings's book (page 76) vary from 68·6 per cent. to 78·0 per cent. according to the particular groin affected. The other forms of plague (as to which no statistics are given) are more deadly, and it is therefore probable that the figures, if given completely, would work out about the same as Sir Patrick Manson's. I will now take the percentage of deaths in plague camps available for the last two years, as given in the annual reports (G.Os., Nos. 270–271 P., dated 5th March 1903, and 198–199 P., dated 27th January 1904): for 1901–1902, Bellary 52·38 per cent. (*vide* Part III, paragraph 18), Jalarpet 40 per cent., camps in the Hosur division 46·8 per cent., camps in the Tiruppattúr division 38 per cent., North Arcot 73 per cent. Only in North Arcot did the percentage approach the normal percentage of death from the disease. I now take the figures for 1902–1903: South Canara 73·33 per cent., North Arcot 68·4, Jalarpet 49·15. As regards South Canara, the figures are lower than the figures for the Catholic Private Hospital (77·7 per cent.), a building spoken of in the most laudatory terms by all the witnesses, as will be shown in due course. Mortality in plague camps.

6. I have put down all the figures available in these two reports exactly as given: if they are taken simply as they stand, they show that the mortality in plague hospitals is less than the usual mortality from plague: all deductions and allowances that have to be made in regard to the figures tell strongly in favour of the hospitals: the patients (except in the case of Jalarpet camp) will ordinarily be taken from the poorest and the most neglected classes and will largely consist (in places where epidemics are raging) of those whose families are unable or unwilling to look after them: further, they will generally be discovered and received into the hospitals at a late stage of the disease: deductions must be made on both accounts, if the comparison between hospital treatment and home treatment is to be a fair one. The biggest figures (and those, which are, therefore, fairest for purposes of comparison) are the figures supplied by Bellary and Jalarpet: in each of these cases, the percentage of deaths is strikingly low.

7. One or two further comments seem called for in regard to these figures. In the case of the Vellore hospital (which supplies the bulk of the figures for North Arcot), the inmates resort almost entirely to the treatment of their own doctors, there being a prejudice against European treatment in Vellore. This probably contributes in a great degree to the comparatively high mortality in that hospital. A supervisor in Coimbatore remarked that "if the patient dies through the unskilful

"treatment of the private practitioner, the hospital is thereby rendered unpopular "in the eyes of the ignorant public." I shall recur to this subject later. I think that enough has now been said to show that, whatever may be the defects of plague hospitals, the facts lend no support to the popular view that there is any unusually high rate of mortality in them; the explanation of this charge must, I think, be sought for in collateral sources of complaint and distrust.

Popular complaints as to distance of camp from towns.

8. There is one grievance, which I will discuss first, not because it is the most important, but because it furnishes the best clue that I can find to the popular attitude described above. This is the fact that hospitals are frequently located far away from the infected town (two miles in the case of Mangalore and Ootacamund) and that the patient is much shut off from his friends and relations. Major Crawford and Major Wright attribute a good deal of the unpopularity of their hospitals to the distance at which they are located from their respective head-quarters. Major Crawford and Mr. Krishnaswámi Aiyar point out (very truly) that there is no particular danger of infection arising from a plague hospital, and Mr. Krishnaswámi Aiyar is anxious, on these grounds, that freer access should be given to relations to visit the patients.

9. The question is by no means a simple one. Plague hospitals are undoubtedly not infectious, as they stand: but why? Because strict antiseptic precautions are maintained and no sources of infection are allowed to remain without proper treatment. The *unrestricted* visits of friends, relations, quack doctors and so forth would completely change this state of things: not only would it render the hospitals a possible source of infection, but it would introduce an element of possible infection into the hospitals from outside. Visitors are allowed by the rules, but there should be fixed hours at which visits are to be paid, in order that the medical officer may be in a position to guard against carelessness and lack of sanitary precautions. Further, it is much better for the patient that he should be disturbed as little as possible. Father Rondy drew my attention to the annoyance caused to the plague nurses by the indecorous conduct of relations of the plague patients, whose visits to the Coimbatore Plague hospital were apparently not sufficiently supervised.

10. The same objection seems to me to apply, as Mr. Mullaly and Captain Gabbett point out, to placing plague hospitals too near towns. When the evasions of rules become easier, it becomes increasingly difficult to guard against them. If the hospital was close to the town, it would be a matter of extreme difficulty to prevent the guards (often venal or careless) from allowing visitors to be dropping in and out all day. Further, when the town is infected, there is the fear of the hospital, if very near, becoming infected by the agency of rats.

Suggestion to appoint non-official visitors.

11. None the less, there can be no doubt that the seclusion of the patient and the remoteness of the hospital, necessary as both measures may frequently be, serve to lend an air of mystery to these institutions, under the shadow of which (as remarked in the Kurnool Conference) wild rumours circulate. A very practical suggestion was made on this matter in the first Bellary Conference, namely the appointment of non-official visitors to inspect the hospitals. Major Crawford points out that this is being done in Ootacamund and I think that such a course would be possible as well as very desirable in towns which are large enough to have a hospital at all. Such visitors would be selected by the Collector and entitled to have access to the hospital at any time within stated hours (which should include a wide margin, so as to allow of surprise visits) and could enter their remarks in a book kept for the purpose. Many individuals could be found from the ranks of missionaries, pleaders, merchants, etc., who would not only be representative of popular opinion, but would also be able to give the authorities valuable suggestions. It must, of course, be understood that their functions would be confined to making suggestions and would not include the power to interfere with or issue orders to any of the officials on duty on the premises. It would be for the local authorities to see that no gentlemen were retained on the visitors' list, except those who displayed a real interest in the matter. The practical value of much of the vague criticism, to which the administration of our plague hospitals is now subjected, would in this way be put to a real test.

12. It is, however, generally recognized that the most important element in the success of a plague hospital is the personality of the officer in immediate charge. A careless medical officer appears to have rendered the Hosúr hospital extremely unpopular for a time (*vide* the Hosúr Conference), whereas the services of many of the medical officers have been spoken of in terms of respect and gratitude. This is a matter on which no rules can possibly be laid down. Heads of the Medical Department doubtless recognize even now that nothing is more important to the success of our plague administration than the presence of a courteous, energetic and capable medical officer at the head of each plague hospital. It has been suggested that some reward or recognition should be awarded to medical officers who manage their institutions successfully. I certainly think that it would be an admirable thing, if all approved work in connection with plague hospitals (or indeed of plague administration generally) were recognised as a just claim for promotion in the case of the subordinate medical staff. The fatal thing is that plague duty of any kind or sort should ever be looked on as a punishment or as a mark of inefficiency. This subject is fully dealt with in the course of Part IX of this Report. There is no agency which seems to me better fitted for bringing the people in touch with the authorities in plague matters than the subordinate medical staff, and such is the almost unanimous opinion of the officers whom I have consulted. Of positive neglect or ill-treatment I have not heard many complaints, though there seems to have occasionally been a little roughness at the time of the outbreak of epidemics at Coimbatore and (at times) in Bellary and Hosúr (*vide* the evidence of Father Rondy, Father Houbaer and Mr. Nílakanta Mudaliyár). In times of stress, this is perhaps hardly avoidable, and it has to be noted that in such cases the defects were admittedly only of a temporary nature. The devotion of the French Catholic Nurses, who attended the sick in Coimbatore and Hosúr, was much appreciated and was specially brought to my notice.

Necessity for energy and courtesy in the staff.

13. I suspect that one of the first subjects, in regard to which non-official visitors would find cause for comment, is the character of the buildings erected. There can be no doubt that the familiar mufassal type of hospital, frail and wind-swept and consisting of a long row of lugubrious and uncomely stalls, can hardly be considered either inviting or salubrious. An article in the *Lancet* for the 23rd of May 1903 speaks of a Maratha hospital in Bombay as in some degree owing its popularity to its cheerful appearance. I would add that some solidity of construction would be a real improvement, from the point of view of the safety and comfort of the patients. The surface material of the walls may consist of tatties, but these should, if necessary, be of two thicknesses, and the wood forming the frame-work of the tatties should be solidly and durably put together. It is not impossible to give a building of this kind an attractive, an almost gay, appearance: the plague camp at Jalarpet merits this description. A more detailed description of this well-built and well-managed camp will be found in Appendix IV and in the course of Dr. Lubeck's evidence [Appendix VI-A]. I could wish that each of our plague hospitals had a resident doctor: assuredly any medical officer, who had nothing else to look at all day long but plague camps, would be driven to protest and appeal, until he had secured the funds for a substantial and comfortable-looking set of buildings, whether from the authorities or from the public.

Advisability of constructing better hospitals.

14. It is not my intention to impute any special blame to the local authorities for the existing state of affairs. Bankrupt District Boards and Municipalities, if possible, still more insolvent cannot be expected to spend more than the bare minimum on their hospitals. Whether their burdens can be lightened in other respects, with due regard to efficiency, will be considered in later chapters of this report, but, meanwhile, I would respectfully urge a few points for consideration. Patients are segregated not on their own account but for the good of the community. They, therefore, seem to have a very strong claim for special consideration and to deserve something in the nature of *comfort* in their housing, so far as financial considerations would permit of such a course. Further, any discomfort or exposure to the inclemency of the seasons to which they may be subjected, in so far as it increases the unpopularity of the measure, tends to make people the more anxious to conceal

cases of plague, and this tendency is (as I shall show later on) very imperfectly counteracted by the existence of the sanitary staff, as at present organized. Thus, on all grounds, increased attention to the comfortable construction of plague camps seems very desirable, even if it involves some extra expenditure: I fear, however, that neither Local nor Municipal funds could stand any further drain on their resources, and it would seem to follow that (for the present at any rate) additional expenditure would have to be met from Provincial revenues. Mr. Rice and Major Wright, as well as the Salem Conference and both the Bellary Conferences, emphasise the necessity for a more solid and permanent type of building as a means of reducing the unpopularity of the measure. The buildings at Kolar and Jalarpet are excellently constructed and this, from the description given me of them, would appear also to be the case in regard to the hospitals at Hosúr and Matigiri. The Sanitary Commissioner has, from time to time, drawn attention to defects in particular hospitals (G.O., Nos. 216 P., dated 10th February 1902, and 213 P., dated 21st February 1903, etc.).

Official supervision necessary.

15. A good medical officer on the spot (it would, in my respectful opinion, be more satisfactory, if he resided at or close to the hospital) and a body of energetic and critical (but not interfering) non-official visitors would be the best means of ensuring that the patients were kindly and carefully treated—as, I am pleased to record, they usually seem to be under existing conditions—and would also tend to bring about a more general recognition of these facts (a result, which cannot, I think, be brought about, unless the hospitals are to some extent open to the inspection of the laity), but, as these advantages cannot always be ensured, it is well that the authorities should avail themselves of every possible check of which the circumstances admit. Mr. Brodie notes that it is no use locating an hospital at any place where there is not a Revenue subordinate of the grade of a Deputy Tahsildar at lowest and that it is essential that he should interest himself in the hospital. In order to prevent friction, it would, I think, be well that the province of a Tahsildar, Deputy Tahsildar or Sub-Magistrate should be (officially) limited to making remarks in the same way as a non-official visitor, at least so far as the exclusively medical aspect of the hospital is concerned: in the hands of an influential and tactful Revenue officer, this power would be sufficient. In any case, every Tahsildar or Deputy Tahsildar, at whose head-quarters there is a hospital, should in some way be made to feel himself personally responsible for seeing that it is being managed in a careful and conscientious way. In Hosúr, I was informed that, unless the Divisional Officer was in head-quarters, there was no one who considered himself entitled to exercise any check over the working of the hospital.

Hospitals should be built in a series of one-patient wards.

16. My plague hospitals at Conjeeveram in 1899 were built in blocks containing only two wards each, each ward capable of holding one patient comfortably. In Trichinopoly, the recently built plague camp, though not a particularly inviting building, has been constructed on the same general principles. Thinking it probable that this would be recognized as an improvement on the standard plan, I put forward the subject for discussion at each Conference, and it was unanimously agreed that such a form of construction would be an improvement on the long sheds now in vogue, both because it would make it more possible to separate off castes and because it would render disinfection easier. More than one witness emphasised the necessity for immediate burning down of a shed in which a patient had died, both on sanitary grounds and because patients had a horror of occupying sheds which had been the scene of fatal cases. This prejudice (if it can be so called) seems to deserve every consideration, but, judging by the manner in which its importance was emphasised at the Guntakal and second Bellary Conferences, I am led to conclude that the practice cannot be quite uniform in this matter. There is a little incident in connection with my Ilitorai Inspection Notes (noted in the course of Dr. Lubeck's evidence) which shows that even the hill-folk occasionally raise objections to arrangements which might expose them to contagion. I need hardly point out how much any arrangement, which made it more possible to house different castes separately from one another, would tend to reduce the unpopularity of hospitals. Further, more than one witness has emphasised the fact that a sick man likes to feel himself alone and does not care about the idea that strangers are

near him: this view must, I think, command the sympathy of every one, irrespective of caste and creed. I notice that the system of building hospitals in separate blocks has been independently resorted to in the Coimbatore and Cuddapah districts. It might be a little more expensive, mainly on account of an additional amount of cement floor being needed for the verandah round each block, but I submit that the extra money would be money well spent.

17. Though I am of opinion that some diminution in the unpopularity with which plague hospitals are now regarded might be effected by the adoption of the improvements suggested above and though I think that improvements on these lines would remove any *just* cause of complaint which may now exist, I do not delude myself with the notion that such a measure as the isolation of the sick will ever be other than unpopular. Hindus, it is said over and over again, like to die amongst their relations: in this, they are not singular: relations, on the other hand, find it irksome either to go and live in the camp or to pay visits to the sick patients at stated hours: this again can be readily understood: moreover, in addition to their own special disadvantages, plague hospitals share in the unpopularity which, in the minds of many natives, attaches to European systems of treatment as a whole. The compulsory removal of the patient grates on the feelings of his friends: the lowly class of many of the patients makes the removal to the same locality seem a degradation in the eyes of the comparatively well-to-do. The seclusion, in which some classes, and especially the Muhammadans, wrap themselves up, makes the very idea of a public hospital most repugnant to their feelings. The Muhammadans of Vániyambádi have always shown a violent aversion to this measure (Plague Narratives of the Salem district for January and March 1901 and October 1902). The complete indulgence of these feelings, however much we may sympathise with them, would strike at the root of our plague policy. It is to minimize these *necessary* evils that the system of caste and private hospitals has been so strongly pressed on the inhabitants of big towns. I will now say a few words on this subject.

Caste and private hospitals,

18. The right to build private hospitals has very seldom been taken advantage of, the reason assigned being as a rule lack of funds and organizing power. As Mr. Rice puts it, the rich seldom require them and the poor cannot afford to build them. Doubtless, as Captain Cornwall observes, they would serve a most useful purpose in regard to classes which are not enlightened enough to appreciate European treatment, but are not so destitute as to be indifferent to the kind of treatment they receive: it has been suggested to me by a non-official that it would be well if Government furnished the whole of the money required for their construction and maintenance, but left the management in the hands of a respectable Committee of native gentlemen and simply insisted on inspection of accounts. Judging from the Bellary district, where the system of Private Hospitals has actually been resorted to, efficient committees are by no means easy to find. The system has been tried in Bellary, Hospet and Adóni, but has always broken down more or less completely, the supervision being defective and the patients neglected, insomuch that it has more than once ended in the Government Medical Officer being called in or in the authorities being requested to transfer the patients to the Government Hospital. The system having failed so completely in Bellary, I must confess myself far from sanguine of its success anywhere else, and the existing *rules* seem sufficient in themselves. There are two conspicuous exceptions, namely the Kolar and Mangalore private hospitals, organized by the Gold Field and Catholic Missionary authorities respectively: Father Müller's description of the numerous applications which he receives from Hindus for admission is interesting reading; both these institutions, however, being under European management, offer no guarantee of success in regard to private hospitals not so controlled.

a failure in Bellary.

19. There is a strong feeling among the authorities in the Coimbatore and Salem districts against the admission of unqualified native practitioners into plague hospitals, unless they take up their residence there. The majority of the officers consulted have no objection to such practitioners being allowed into the plague hospitals; they remark that, in the result, the permission has very little effect, as the practitioners themselves neglect their patients, who are thus very soon converted to European treatment. It seems against the orders of the

Question of the admission of unqualified native practitioners.

Government of India that European treatment should be *forced* on any plague patient, the object with which he is isolated being a purely sanitary one, and in practice it is clear that the ignorance and apathy of these quacks is quickly realized by the patients. Mr. Ranganátha Mudaliyár, an ardent and avowed believer in the native practitioners of Tiruppattúr (who would seem, in some cases at any rate, to be decidedly superior to the generality), speaks in graceful terms of Dr. Lubeck's deserved reputation amongst those who have experienced his treatment. The admitted impossibility of getting the private practitioners to attend the Plague patients led to the break down of the system of private hospitals in the Bellary district: on the whole, I think that, so far as the present question is concerned, they have very little significance. Their attitude to the authorities will be more fully discussed in Part X. There are of course some very respectable Hindus, who dabble in medicine in a small way: two of my witnesses (*vide* the Vellore and second Bellary Conferences) were of this class: but these gentlemen seem to steer clear of the treatment of plague cases and are therefore without significance in regard to the question now at issue. Having now treated those aspects of the question of plague hospitals which seem to demand comment, I will recur to the subject of remedial measures in general. I may note that the question of the period for which convalescents should be detained in plague hospitals has been dealt with in paragraphs 17 and 18 of Part III.

General remedial measures:—

20. In Part V, I discussed the evidence in regard to the influence of rats and grain on the spread of plague, as also the influence of animals and insects generally: the question as to whether any additional measures were called for in this matter was reserved for discussion in this chapter. Apart from certain measures adopted from time to time in the Salem district, which are not fully described and appear to have met with no great amount of success, I find three measures which may be said to have been adopted with some approach to uniformity: (1) advice to the people, (2) the use of tar and sulphuric acid and (3) rewards. The first measure cannot be adequately dealt with, until the feelings of the people themselves have been discussed. The matter is not one on which it is easy to come to a decision, some witnesses thinking that the people understand that rats are the actual cause of infection, others thinking that the people regard them simply as an useful warning. On the whole, I am disposed to think that the people would be delighted to have rats destroyed, especially as they are a cause of great annoyance, apart from plague altogether. There is no reason whatever to suppose that they would offer any resistance to such action as Government might think fit to take in the matter, but it is unlikely that their active co-operation could be counted on to any great extent. There is more than one reason for fearing that their attitude will be simply passive: in the first place, most natives have a rooted objection to doing *anything* which is out of the ordinary routine of their daily life: the stress of mortal terror is needed to drive them for a moment out of this attitude (Part V, paragraph 55) and, further, they may be excused, if they deem it an impossible task to thoroughly clear their villages (or even their houses) of rats. I doubt whether the idea of rats being a warning and nothing more is really of *popular* origin: it is too ingenious and too perverse. I can find no trace of any religious objection on the part of any class of natives to the killing of rodents and in several places, I heard of traps and cats being kept by caste Hindus, as well as others, to keep rats and mice down: I should suspect that the reasons for this were, for the most part, unconnected with plague. In these circumstances, I do not think that advice in the matter will by itself succeed in keeping the rat-population down to a very large extent, though it would no doubt be a good thing that the pamphlets contemplated in paragraph 51 of Part III should contain a statement of the fact that rats act as disseminators of infection and that their destruction would be desirable, with arguments of a simple nature in support of these propositions. Captain Gabbett issued hand-bills on the subject in Coonoor. They are printed in Appendix VII. Advice apparently met with a poor response in the Salem district (*vide* G.O., Nos. 824, 824-A. P., dated 24th July 1900). I have heard a vague fear expressed by some gentlemen in the course of casual conversation that the eradication of rats might cause other evils, possibly of as serious a nature as plague itself. Darwin has, doubtless, given many examples of

Measures for destruction of rats:—

advice to the people:

subtle inter-connection in the scheme of animal life, but I scarcely think that this apprehension, in the absence of some tangible evidence, should prevail against the positive advantage of the eradication of plague in its epidemic form. I have heard no other arguments advanced against the advisability of the destruction of rats.

21. Proceeding with the list of remedies adopted in this Presidency, I find that the offer of rewards is perfectly useless and recognised as such by every official who has ever tried it. If the rewards are put at a low figure, people are apathetic in the matter and no rats are produced : if they are put higher, there is at once a tendency to breed rats for the sake of the reward. Rs. 15,000 was expended in rewards in Madras City for the tails of between 600,000 and 700,000 rats, mice and bandicoots, and Captain Cornwall remarks that at the end they were as numerous as ever. Experience was the same in Hong Kong, where the system was tried and had to be given up (*vide* also G.O., Nos. 1144, 1145 P., dated 18th August 1902). offer of rewards

22. The use of tar and sulphuric acid for the destruction of rats is suggested as a precautionary measure on pages 33–34 of the Plague Inspector's Manual. Again, in the notes on the inspection of the Vellore Municipality (G.O., No. 244 P., dated 3rd March 1904) I find that "in parts of the town in which dead rats have "not yet been found and in any house that is disinfected, tar and sulphuric acid "should be systematically used : a special effort of this nature should be made in all "houses close to the infected block." Reference may also be made to Circular No. 1943 S., dated 16th May 1903, issued by the Sanitary Commissioner on this subject. The use of this remedy, which the Sanitary Commissioner learnt from a chance railway companion (*vide* G.O., Nos. 270–271 P., dated 5th March 1903), has been much misunderstood. The remedy may, no doubt, be legitimately used, to drive rats away from any given place, which it is of particular importance to keep rat-proof. In this it is sometimes successful, though by no means universally so. Doctor Lubeck succeeded in clearing his plague camp by this means, but not his observation camp. The rats, thus ejected, have a tendency to re-appear in any time from 2, to 15 days [*vide* the evidence of Colonel Smyth, Mr. Wait (Adóni Conference), Mr. Evers (Kurnool Conference), Mr. Bardswell and Mr. Vásudéva Rao and a letter from Mr. Marden of Coimbatore]. The reason assigned for the brief nature of the immunity afforded in many cases is that the mixture ceases to give off fumes almost at once and hardens very quickly. Colonel Smyth is inclined to think that tar, if used alone, would have a more lasting effect. Rats are very rarely killed by its use. Plainly, from this point of view, it is mainly to be regarded as a personal prophylactic, like inoculation. Its use will tend to render particular houses immune for a time, thereby giving the inhabitants a better chance of escape from the disease. From this point of view, its use might perhaps be recommended to the inhabitants of towns and villages in the hot months of the year, especially if their houses had been plague-infected in any preceding epidemic. It is not mentioned in Colonel King's draft hand-bill. use of tar and sulphuric acid,

23. With all deference to any authorities who may hold the contrary view, I would strongly deprecate the use of this specific in the course of epidemics. It is true that it might be theoretically possible to use it in such a way as to drive rats hitherto unaffected out of the town, but in practice the large areas to be operated on and the enormous number of rat-holes to each burrow (*vide* the evidence of Mr. Ranganátha Mudaliyár) render this absolutely impracticable. Mr. Richards and Mr. Wait have tried its use on these lines and have failed. The disadvantages of using it during an epidemic are that it prevents concentration of effort on really germicidal operations and (far more important) that in practice its only effect is to send rats flying in all directions, diseased and healthy alike, and that it thus tends in obvious ways to spread plague with the utmost possible vigour. There is no particular objection, perhaps, to its use in the course of disinfecting particular houses. The mere operation of disinfection is pretty sure to scare away the rats for the time being. The mischief being done, the application of tar and sulphuric acid may prevent the rats coming back again and thus complete the work of local prophylaxis. Personally, however, I should suggest that, where possible, the rat-holes should be completely dug up (Part IV, paragraph 48). The method deprecated during an epidemic :

of digging up rat-holes is in use in the Kolar Gold Fields, was used during the Queensland Epidemic of 1903 (British Medical Journal for 4th July 1903) and finds a prominent place in the instructions given in the Glasgow Circular, which are of a most detailed nature (Jennings, 225). The Rev. Mr. Lucas (second Bellary Conference) remarks that it was commonly supposed that plague *was* spread in Guntakal by the indiscriminate use of tar and sulphuric acid and Colonel Pemberton (Bellary) notes that, on its use by the railway officials in their lines, the rats spread to the town and jail. Its use at the time of epidemics seems, in my respectful opinion, to be a most dangerous measure.

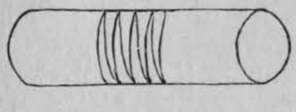
24. Whether the use of tar or tar and sulphuric acid *in the hot weather* throughout a village or town might have advantages from the point of view of the community is a difficult question to answer: to adopt such a course would be taking a leap in the dark, for I do not find that the remedy has been adopted anywhere out of this Presidency: apparently, its immediate effect would be to drive the rats out into the fields, but I can hardly imagine that the process could be carried out sufficiently systematically to clear a whole town or village of rats and to keep it clear for the future. Another immediate effect would probably be the destruction of crops noted as the result of the emigration of rats in Anantapur (Guntakal Conference). My own view is that tar and sulphuric acid is harmful, except as a *personal* prophylactic, and that, even from that point of view, the person using it passes on to his neighbour the exact amount of risk which he escapes himself: from this point of view, it is vastly inferior to inoculation. As already noted (paragraph 26 of Part VI), it is doubtful whether *purely* personal prophylaxis should be markedly encouraged by Government and it certainly seems questionable how far we should encourage each man to protect himself at the direct expense of his neighbour. Hitherto, however, no other remedy against rats has been officially and generally recognised or made use of in this Presidency. Collectors and other local officers are directed to destroy rats [Appendix I (7) to the Mufassal Plague Regulations, page 62], but it is not stated how effect is to be given to this order. Traps are being lent out to residents in Hosúr, apparently with only moderate success, as some of the villagers, when they catch rats, let them loose again at a distance from the town. I have heard of monkeys being similarly dealt with in the Tinnevelly district, when their ravages become unbearable. In the case of rats, the action of the villagers might tend to spread plague.

other methods for destroying rats;

25. It has now to be seen whether we have anything to learn from the example of private persons or of other countries. Cordons for rats have been made use of at Johannesburg (Part V, paragraph 35) and apparently there is a method employed in Sidney for rendering particular wards of a town rat-proof. As I am unaware of its nature, I can offer no opinion on it. The example of Banga (Part V, paragraph 59) shows that no ordinary precautions will suffice for the purpose. The Johannesburg method seems only suitable for a compact location and would be too costly, I suspect, for adoption in this country or on a large scale. Sulphur fumigation is suitable for ships, but I do not think that it is of more extended application: the possibilities of fumigation as a remedy have been dealt with in connection with the subject of bratties. The use of rat-catchers seems liable to the same danger as the granting of rewards: the example of snake-charmers affords an useful warning of the probable effects of bringing into existence a set of professional rat-catchers. They have been made use of in other countries with some degree of success, and the method is well spoken of in the text-books, but the peculiarities of the Indian character make its application to this country seem of doubtful utility. Hunting and direct killing in all forms present practical difficulties which seem insuperable, though for the protection of individuals they have their advantages. Cats are a very decided source of infection in themselves (Part V, paragraph 18) and the dangers attendant on their retention in houses should be carefully pointed out to all house-holders. All stray cats and dogs should, I think, be destroyed, as recommended by Major Crawford, Mr. Coleridge and Captain Atal, and the destruction of squirrels might also be advantageous from some points of view, though they are not a very serious source of infection. The influence of other animals in the spread of plague (putting aside mice and bandicoots, which can be dealt with conjointly with rats) does not appear to call for practical measures.

26. The setting of traps and the use of cats are the only methods adopted by the people. The use of traps by private persons is certainly to be encouraged and I see no reason why a small amount of money should not be spent, in each infected district, in the purchase of traps by the local authorities (as is now done in Salem) for loan to persons who are too poor to purchase them for themselves: they could be inspected at intervals. Any precautions might be adopted that suggested themselves to the authorities for ensuring that the rats caught were really killed, always provided that no monetary inducement whatever is held out for their destruction. An arrangement, by which the trap should be withdrawn from a given house, unless so many dead rats per month were produced, would be apparently harmless. This need not be regarded as a punishment, but merely as a recognition of the fact that a trap was not required for that particular house. Poison or poisoned baits might also perhaps be supplied, though on this point I am not inclined to venture on a definite recommendation, as there *might* be objections on general administrative grounds to such a course. It should be pointed out to villagers that the *kind* of bait and the *position* of the trap have frequently to be changed, the *acuteness* of rats in this respect having forced itself on the observation of more than one witness (*vide* Mr. Krishnaswámi Aiyar's evidence). In any case, I cannot think that the use of traps would ever amount to more than a *supplementary* method for working out the destruction of rats. It would be of use primarily in the hot weather months. During epidemics, no house-holder would wish to offer any temptations to rats to enter his precincts, nor is it desirable that he should do so. As regards the opinion of the authorities on the subject of traps—*vide* Manson (257), the British Medical Journal for 4th July 1903, Jennings (196, 225–7). I find no mention of traps in the Plague Inspector's Manual. traps and cats;

27. The complete destruction of rats may be a hopeless task, but, if it is to be accomplished at all, it must be by the help of something in the nature of poison. "Rough on Rats" is a well-known poison and apparently an effective one. Colonel Smyth uses it in his own house, and I trust he will pardon me for attempting to describe the method which he adopts. The inside of a hollow metal cylinder is smeared with the poison, mixed with ghee, flour or any other substance that is found in practice to be acceptable to the rats, sufficiently far from either entrance to the cylinder to prevent any larger animal than a rat getting at it: with the same object, the circumference of the cylinder is made large enough to admit of a rat getting through it with comfort, whilst it is too small to allow a cat or a dog to get its head in. I append a rough diagram of the apparatus: the shaded part represents the portion of the cylinder on the inner surface of which the poison should be placed. The object of putting the poison in a *paste* is to make it serve for many rats, as each rat will only be able to nibble away a small portion at a time. the usual commercial poisons.



28. The Common-sense Rat Exterminator has been used with excellent effect on the Gold Fields. Colonel Smyth does not consider it to be harmless to cats and dogs, and other gentlemen consulted are of the same opinion, nor is it found in practice to burn the rats up in the manner advertised (*vide* the Ootacamund Conference). The advertised directions for use are printed in the appendix, but I would recommend Colonel Smyth's method for private use and, in any case the poison should be spread *in a paste* on a large surface (*vide* the Kolar Conference). Poisons are highly spoken of as a method of exterminating rats by all the authorities (British Medical Journal, 4th July 1903; Manson, 255, 257; Jennings, 196, 225, 227). They, one and all, seem to suffer from the disadvantage that the rats have a tendency to die and putrify in their holes: this would probably be less likely to happen, if Colonel Smyth's or Dr. O'Donnell's methods were resorted to. Such remedies are of course only useful and practicable when plague is *not* prevalent, and it is in this way that they are used on the Gold Fields (*vide* the Kolar Conference). Their use might, with advantage, be encouraged and aided among the people in the same manner as that of traps. A *variety* in the methods of destruction adopted would probably lead to the results being more effective. From this point of view,

it would *perhaps* be advantageous to occasionally vary the *poisons* used, but I have practically no evidence as to any poisons but the two mentioned above. It would, no doubt, be practicable in villages to enlist the services of the Village Officers in the matter of rat-destruction generally, though I doubt whether any system of rewards or punishments could be introduced in their case. I reserve the discussion of M. Danysz's method for the moment and pass to the subject of grain.

Treatment of grain as a source of infection,

29. I will commence by putting in a practical form the conclusions arrived at in Part V. Grain coming from an infected village to a free village may be a source of infection in two distinct ways. In the first place, it may harbour rats, dead or alive. In the second place, it may itself be infected by the excreta, etc., of rats. It may be brought on the backs of villagers or in carts, or it may be sent by rail. In the latter case the area of possible infection is largely increased. Within towns and villages already infected, grain constitutes a centre or focus of infection by means of its attractions for rats. So far as grain-shops within infected towns or villages are concerned, I regret to say that I see no remedy whatever of a satisfactory kind, unless and until complete evacuation of the village is resorted to. The problem is of course to render the grain rat-proof, but any arrangements that I can think of for this purpose would be expensive and impracticable. Mr. Mullaly suggested the building of solid granaries in the larger towns. Supposing that this could be worked, it would still leave the problem of the retail-shops untouched. All that seems practicable is to endeavour to induce grain merchants to keep their wares as safe from rats as may be and to regard grain-shops as centres of danger (*vide* the Ootacamund Conference). Any grain found or said to have harboured dead rats should be burnt. The periodical desiccation of all grain in infected areas would be an excellent thing, but I doubt its being found practicable, except in plague camps or in small villages. The same considerations apply to a great extent to food-shops of all descriptions.

when conveyed by rail,

30. So far as grain coming by railway is concerned, there are some interesting remarks (based on a circular of the Acting Collector of Tanjore) to be found in the Railway Conference held at Trichinopoly. The Medical Department of the Railway were of opinion that grain was a possible source of infection, but it was observed that great inconvenience would arise in practice from conforming to Mr. Grimley's circular. It was suggested that " a competent officer of the district should have " to grant a certificate to the effect that the grain had been dealt with to the satis- " faction of the Plague authorities and the Railway Company could then refuse to " receive any grain unaccompanied by such a certificate." That this would be the better course I quite agree, but the question how far it would be practicable and desirable to deal with grain in this manner still remains for discussion. I hardly think, in practice, that grain, travelling in slow trains and exposed to a great extent to the heat of the day, is likely to retain much infection, unless it actually harbours rats, but it would certainly seem desirable from a sanitary point of view that, at stations in or in close communication with infected areas, grain or food-stuff should be searched, to see if it contains rats, dead or alive. Its transport in such a condition would be an obvious and serious source of infection to the place of destination, unless it had first been properly disinfected. It is not, I think, necessary, even on purely sanitary grounds, that grain which does not contain rats or any other *obvious* source of possible infection should be interfered with. Any measure introduced with the object of searching grain would involve the granting of certificates in the manner indicated at the Railway Conference quoted above. The difficulty of carrying out such a rule in practice would be that, except in the bigger towns, there would be no subordinate who could possibly be trusted with the powers involved in such a regulation. At big stations, such as Bellary, Hospet, Adóni, Gooty, Anantapur, Penukonda, Coonoor, Coimbatore and Erode, adequate supervision would be possible, and fraud and extortion could be in some degree controlled, but the head-quarters of districts and divisions are not the only places from which grain may be exported and, apart from this, to confine a rigid system of examination to certain places might lead to the transport of grain to the smaller adjacent stations and thereby defeat its own object as well as dislocating railway traffic. It may be noted, however, that evasions of this kind would involve consignors in

considerable inconveniences and would also, by securing a journey by road for the grain, secure a certain amount of natural disinfection. I am, therefore, disposed to think that the scheme would, on the whole, be practicable and desirable, though not of course complete in its operation. I do not think that the mere examination of consignments of grain and food-stuffs to see whether they contained rats or were in any other way obviously suspicious would be such a lengthy matter as seriously to inconvenience the traders or the Railway authorities. It may further be noted that such measures would only be in force while the towns in question or the neighbourhood were actually on the infected list. The proposal to appoint inspectors to watch for the *arrival* of grain from infected localities was negatived in G.O., No. 1330 P., dated 18th November 1903. I now proceed to discuss what can be done, in the case of grain transported by road.

31. In tracts imminently threatened with plague, it would, from a sanitary point of view, be desirable that grain which cannot be shown to come from an uninfected locality should be disinfected, but it would be of little use to issue orders on such a subject in places where there was no one but a village munsif to carry them out. In practice, the only places which could be dealt with from this point of view are the head-quarters of sanitary inspectors and, even in those places, it is extremely unlikely that any measures would be properly carried out, unless the place were the residence of a Deputy Tahsildar or higher official. Thus, the field that can be practically protected from invasion by infected grain is a strictly limited one. Within those limits, it would seem to be practicable to disinfect all grain that could not be shown or presumed to come from an uninfected area, but I am forced to admit that nearly all the administrative officers whom I have consulted consider that the practical inconvenience and difficulties of the measure, even if confined to Unions and big towns, would outweigh its advantages, and some of them consider it definitely impracticable. The measure is at present actually in force in Ootacamund in a modified form, but Captain Gabbett found it impracticable at Coonoor. The exposure of unopened gunny-bags to the sun was practised at one time in Hindupur, but I doubt whether this would have much germicidal influence. I cannot disregard an unanimously expressed unfavourable opinion in regard to a measure on the part of those officers whose duty it would be to carry it out. I must therefore (though with reluctance) limit my proposals to an examination of grain and food-stuffs on the same principle as that suggested at certain railway stations in the last paragraph, though I would strongly recommend that, in places where local officers find it possible to carry out the more thorough system of disinfection of grain proposed, they should do so. The number of cases in which infection has actually been traced to grain suggests, to my mind, that it is probably a source of infection in many other cases in which no history of infection is traceable.

when conveyed by road.

32. As regards the mode of disinfection, the burning of a substantial layer of the portion of the grain in which the rat or other infected substance was found and the desiccation of the remainder seems sufficient. Exposure to the sunlight in thin layers is the ordinary means of desiccation, and this is of course sufficient, when there *is* sunlight. At Kolar, grain is desiccated by being shut up in a room in which bratties are then burnt. This would seem to be the only practicable process in wet weather.

Mode of disinfecting grain.

33. Shandies (markets), in infected places or places threatened with infection, must necessarily, according to the principles submitted in this report, be considered to be fruitful sources of infection. Where it is practicable, the best course would seem to be to prohibit them altogether for the time being: this has actually been done in some cases in the Anantapur district: where this cannot be done, the need for a rigid inspection and desiccation of grain, which cannot be shown or presumed to have come from uninfected localities, seems particularly evident. I am not clear why intending visitors to the shandy, who are likely to bring grain or food-stuffs, should not be warned that they must come one day earlier in order to submit their wares for disinfection. The villages, from which visitors to a given shandy bring their wares, are well known, and the usual method of proclamation could be adopted, in order to give them notice of the measure. The market enclosure would be an excellent place for a disinfecting shed, where the grain could be disinfected by the use of bratties in wet weather.

Markets in infected places.

General summary.

34. At this stage, it will be desirable for me to sum up the main conclusions arrived at so far in this report. In Part III, I took the plague patient as the starting-point of my discussion. It became clear, as the discussion proceeded, that he could convey infection to the outside world by three methods (1) through the medium of human beings (paragraph 22), (2) by infecting the soil (paragraph 23) and (3) by infecting rats, mice, etc. In paragraphs 1 to 9 of Part V, it was found that, however important might be the part played by the human being in transmitting infection to distant localities (the measures to be taken in regard to this contingency have to be discussed under group B), his power of giving the disease its epidemic character was insignificant: it was further found that this limited power of conveying infection could not be appreciably reduced by inoculation, and it seemed that no practicable scheme for promoting inoculation could be devised by which the saving of many individual lives could be effected: it was further found that any systematic attempt to extend the scope of inoculation would be likely to have an unfavourable effect on our existing plague measures (Part VI, paragraph 22): again, as regards soil infection, it was found that it could not spread the disease, but could merely perpetuate it. Rats, mice, etc., have been found, in part V, to be the main feature in the dissemination of epidemics of plague in towns and villages and cannot be neglected in enumerating the causes of the spread of the disease outside of the infected town or village within a limited area. It is further obvious that, when a disease *is* spread from one village to another by rats or grain, it will present most serious features, the disease being likely to appear in an epidemic form at any moment. So impressed is Mr. Robertson by this fact that he uses it as an argument in favour of the abolition of the passport system.

35. Soil-infection may, it was found (Part III, paragraph 46), be permanent as a sequel of imperfect disinfection (Part IV, paragraphs 25 and 26). Chemical disinfection was found to be imperfect, mainly in so far as it did not adequately guard against the diffusion of infection by rats (Part III, paragraphs 24 and 25). Detailed suggestions were offered, in view to rendering disinfection more perfect within its own limits (paragraphs 24, 29 and 48 of Part IV). The fact that disinfection cannot immediately follow on infection must, however, always provide a loop-hole for the diffusion of the disease, however perfect the subsequent disinfection may be. Mr. Richard's experience in Salem (Part V, paragraph 57) shows the enormous practical importance of this consideration. Neither the use of tar and sulphuric acid nor Mr. Krishnamáchári's ingenious device in Mangalore nor any other method that can be adopted at the time of an epidemic can, I think, have any hope of meeting this difficulty successfully, except very occasionally and by a rare accident.

Treatment of epidemics in large towns :— complete evacuation,

36. I may here insert a note on the subject of the treatment of epidemics in big towns. Complete evacuation on the occurrence of epidemic plague or extended rat-infection is, as has been so often observed, the really sound measure, where it can be adopted. It has been already pointed out (Part II, paragraph 9) that it is obviously the soundest policy, having regard to the possibility of *permanent* soil-infection and the extreme likelihood (amounting to something like certainty) of *temporary* soil-infection. It must now be further pointed out that it seems to afford the best possible chance, I might almost say the only chance, of the rat-epizoötic culminating and dying away without a corresponding infection of human beings. Under such conditions, I do not see how the most energetic measures of disinfection can do anything but good, provided a careful watch be kept in the camps to see that no rats immigrate into them from the towns. This is one amongst other arguments for putting the camps at a fair distance from the houses. If recrudescence were eventually to be *disproved*, evacuation *without* disinfection would seem sufficient: but this hypothesis seems unlikely (*vide* Part III, paragraph 46). The Head-Quarters Deputy Collector, Anantapur, points out with considerable force the desirability of empowering Plague officers to break open locks in order to carry out disinfection, as the value of the process is largely neutralized, if action in this matter is not prompt and does not extend to *all* the houses of the infected block.

partial evacuation.

37. When *complete* evacuation of a town is impracticable, the policy of evacuating the town in blocks for purposes of chemical disinfection has sometimes

been resorted to. Here we have, it seems to me, a balance of advantages and disadvantages. The advantage is that the whole town gets disinfected at one time or another and that in this way the chance of the soil being permanently infected is lessened. The chance cannot be completely removed, owing to the possibility of rats returning to their old haunts and (to put it colloquially) "dodging" the disinfector. On the other hand, there is the undoubted and very real danger that, in disinfecting one portion of a town, we are inevitably stirring up the rats and driving them into the quarters of the town from which the inhabitants have not been evacuated. Here again, I would appeal to the experiences of disinfecting officers narrated in paragraph 57 of Part V (*vide* also paragraph 23 above). Captain Gabbett's evidence contains some observations on this matter. These considerations, coupled with the undoubted discomfort caused to the inhabitants, make me doubtful as to the expediency of the disinfection and evacuation of large towns *in blocks*. The scaring of men and rats at the commencement of epidemics may sometimes be a *necessary* evil, but that it *is* an evil seems demonstrable. It has also to be remembered that evacuation of big towns (partial or complete), whenever it partakes of the nature of a "scare," has a tendency to spread the disease broad-cast, and the systematic insistence on passports is an almost hopeless task under such conditions. This constitutes a strong additional reason against too great rigidity in enforcing unpopular measures at the time of epidemics, unless their positive advantages can be very clearly demonstrated. The time for really effective remedial measures seems to be pre-eminently the hot weather, when there is little or no plague. Disinfection, without any evacuation at all, seems to me almost useless. How, even under the strictest precautions, can the presence of all the clothes and personal property of the house-holder be secured? An arrangement, by which the house-holders undertook to take charge of part, at any rate, of one another's property for the time being, could hardly be effectually defeated by any arrangement which suggests itself to me; yet it would tend to render the disinfection nugatory or almost nugatory. If further confirmation is needed of a proposition which seems almost self-evident, I would solicit attention to Captain Standage's experiences in the Civil and Military Station, Bangalore, and to Captain Gabbett's evidence as to the house in Wellington six times disinfected (without evacuation) and six times re-infected (*vide* Part IV, paragraph 46).

38. Perhaps, some doubt may be raised as to the validity of the theory advanced in regard to the exclusive importance to be attached to the combined action of rat-infection and soil-infection in spreading and perpetuating the disease in and around infected areas, on the ground that the hypothesis does not account for the dying down of the infection in the summer months. This fact remains hitherto unexplained on any hypothesis. Dr. Simond suggests that the subsidence of the disease may be due to the epidemic having spread through all that portion of the rat-population which is susceptible (*vide* Part V, paragraph 15): some have suggested a migration of the rat-population as an explanation. So far as the infectivity of the soil is concerned, little is known on the subject, but there are apparently forms in which the bacillus might remain for the time being in an inert and harmless condition, being eventually revived in some unknown manner by climatic or other conditions (*vide* Mr. Brodie's evidence).

39. The likelihood of rats and grain being transported from village to village and thereby spreading infection in its most insidious form led me to enquire whether any adequate steps could be taken to guard against this evil The possibilities have just been discussed and it will be seen that they fall very far short of a perfect cure. Against the *spontaneous* spread of disease by rats, whether within or near an infected area, I am aware of no *direct* remedy whatever.

Destruction of rats the only way to stop an epidemic.

40. Seeing the infinite variety of ways in which rats might spread the disease and their unique position as carriers of infection, their destruction presented itself to my mind as the only possible solution of the problem of crushing plague in its epidemic form. In an article contained in the *Lancet* of the 9th of May 1903 (printed in Appendix V), the supreme importance of this matter is impressed on Indian authorities, who are reminded by the writer of the serious effects of giving

way to antiquated prejudices in a matter of this description. The difficulty, however, cannot be overcome by mere admonitions of this description, however well meant. Various measures have been discussed, from paragraphs 20 to 28 of this chapter, but those which seem to offer most prospect of success (traps and the usual commercially sold poisons) all depend largely for their success on the active and hearty co-operation of the people: this is an attitude on their part which we cannot count on as likely to be universal in a matter of this kind. What seems to be essential for India is a method of destroying rats, which shall be at once *speedy* and *effectual* and which should also dispense with the necessity for obtaining the co-operation of the people as a whole.

Dr. Danysz' method of exterminating rats:— 41. In an article in the British Medical Journal for April 23rd, 1904, Dr. Danysz of the Pasteur Institute, Paris, gives an account of his own enquiries and those of other scientists, undertaken with the object "(1) of extending the "field of action of" one amongst certain "microbes and thus rendering it capable "of attacking rodents other than those towards which it was normally inimical, (2) "of maintaining its virulence after having thus raised it to the desired pitch." The peculiarity of M. Danysz's cultures, as compared with the ordinary poison of commerce, is that, instead of merely acting on the individual rat which partakes of them, they communicate to that particular rat a disease which he can in turn communicate to other rats, with the result of a complete extermination of whole tribes of rats, after one or two applications of the method. I quote, from Dr. Danysz's article, an account of the result of the application of the method in Odessa "My cultures were "used to destroy the rats during the outbreak of plague in that city in 1902. There "the rats completely disappeared, after my cultures had been employed . . . . "This extensive experiment, or rather this application of the treatment to the whole "of a great town like Odessa, which with its suburbs has a radius of 10 or 15 "kilometres, may well serve as a model for the use of the treatment in other places

its success in Odessa, ". . . . In most of the small villages round Odessa, it was observed that "rodents completely disappeared, and finally it is to be remarked that, several "weeks after the operations had been carried out, the Bacteriological Institute was "only able to procure 14 rats alive and in good health, although it offered a reward "of 15 kopicks a head . . . . No illness amongst human beings or domestic "animals could be traced to its use. The general out-come of this report is to lead "to the conclusion that, provided a culture of this cocco-bacillus is of sufficient "virulence, it is possible to count upon the destruction by its use of all the rats in "a large city, without causing any danger whatever to its other inhabitants, human "or animal, always supposing that the operations are conducted in an orderly and "methodical manner." It is interesting to note that some varieties of cultures seem to affect mice and squirrels more than rats.

42. In a very complimentary review of M. Danysz's article (appearing in the same number of the British Medical Journal and printed in Appendix V), a reference is made to "an experiment of a limited character conducted with this virus

Capetown, "at Capetown during the earlier part of the outbreak of plague in 1901." The reviewer also observes that "the method of preparing and using the infected bouil-"lon seems so simple that the virus might well be employed in places in England "where the destruction of rats is deemed desirable." In an article in the same Journal, dated 9th April 1904, a reference is made to "the example of Capetown, "which is said to be the only place in South Africa which has really got rid of "plague after it had once become established. This success has been attributed, on "high authority, to the extermination of rats by the use of Danysz's virus."

France. 43. In an issue of the 12th of March of this year, an account is given of the application of the method in the rural parts of the Charante Department of France on the initiative of the Minister of Agriculture. The experiment was conducted under the personal supervision of Dr. Roux, the Director of the Pasteur Institute, and the result appears to have been completely successful. An allusion will be found to this matter in paragraphs 35 and 37 of Part V. An account is given of the unsuccessful and successful methods of applying the process, in Sir Patrick Manson's 'Hand-book,' pages 257–58. Major Jennings (pages 197–199) is not enthusiastic in

regard to the method, but the experiments to which he refers were performed in 1900 and 1902 and do not include those described above, the success of which appears to speak for itself. Colonel King (P.I.M., 34) notes that the method has been used with considerable success. Captain Gabbett, Captain W. H. Tucker and Captain Robb have drawn my attention to Dr. Danysz's work, and Captain Niblock remarks that the method "might with advantage be made the subject of experi-"ment in India. Favourable or unfavourable results" he adds "in other climates "and amongst different fauna cannot be accepted as conclusive, so far as India is "concerned," and Captain Gabbett is inclined to predict that "no other method can "ever be wholly successful." I have ventured to insert, in Appendix V, a fanciful but interesting letter in the *Lancet* of 2nd April 1904, suggesting that something after the fashion of M. Danysz's method may have been known and used in the 13th century.

Suggested experiment on these lines.

44. Accepting the statements in the British Medical Journal, I find that Danysz's virus has been used with success in France, Russia and Cape Colony. One of these experiments dealt with a large city, whilst another dealt with rural tracts: of the Cape Colony experiment I have no details, but the terms in which the result is described above could not well be more flattering. Perhaps Government, having regard to the views submitted in this report and (above all) to the favourable opinion expressed in a leading Medical Journal, may be pleased to think that this matter deserves further investigation. That a campaign on these lines would be an undertaking of considerable magnitude and would involve much expense and trouble cannot for a moment be gainsaid. *Pace* the British Medical Journal, I doubt whether it could be conducted with any hope of success, unless the operations were directed by a medical officer with considerable experience of the methods of the Pasteur Institute. Many grave questions would arise: should the method be applied to towns and rural tracts alike or be confined to the big towns? Unquestionably, the big towns present the most disheartening and unmanageable features of the present situation, but can the towns *remain* secure, while the villages are still left with their rats unaffected? Should the process be commenced along the Mysore frontier, which is a regular recurring source of infection year after year, or should it work from our most important line of defence, beginning (say) with Trichinopoly and Madras and gradually closing in on the area of worst infection? Is the method likely to be practicable in a tropical climate? Will further enquiry confirm the hopes held out in the extracts cited above? Are there any serious practical inconveniences or risks associated with the sudden destruction of myriads of rats? How can they be guarded against? All these are difficulties which suggest themselves to me and in regard to which I am unable, in the absence of the requisite information and knowledge, to suggest any satisfactory answer. Meanwhile, I would respectfully submit that an experiment on these lines appears to me to hold out more hopes of real success in the campaign against plague than any other measure of which I have heard in the course of my enquiries. Apart from this question, I have endeavoured to indicate, in the course of the report, such improvements as seem desirable in our existing plague policy, while it continues to be carried on on its present lines.

Ætiological questions which cannot at present be authoritatively answered.

45. Many of the medical officers consulted by me have expressed regret at the number of questions in connection with the ætiology of plague, in regard to which there is no authoritative pronouncement nor any material to hand for arriving at certainty. I subjoin some of the most important instances which have come to my notice. Very little seems to be known about the septicæmic type of plague and there are conflicting theories as to its cause. The infectivity of food and drink is a matter of discussion. How far and how long convalescents retain infection is an open question, as also the (possible) existence of chronic plague in man, the domestic animals and rodents. The reason for a quiescent period in the history of infection, the alleged periodicity in epidemics and the alleged influence of climate in producing a renewed epidemic are subjects of dispute. The rat-flea theory is under investigation, and Dr. Simond's hypothesis as to the possible agency of those members of the rat-population who are immune from plague in conveying the infection in their bodies (during the quiescent period) and communicating the disease to a new generation of susceptible rats (thereby inaugurating the period of recrudescence) seems

to deserve investigation (part V, Paragraph 15). The whole question of recrudescence and the germicidal effect of chemicals and desiccation are still matters of opinion. The question whether the plague bacillus penetrates below the surface of the floor is not decided. The experiments showing that cloths only retained infection for six days clearly did not re-produce the natural conditions : the experimental results in the case of grain may be equally untrustworthy. The relative merits of izal, chloride of lime and perchloride of mercury as germicidal agents have still to be decided. Lastly, it seems uncertain whether the inoculation of a person incubating for plague is beneficial or the reverse. All these are matters of considerable practical importance and seem to afford scope for prolonged research on the part of our best medical officers, but, in default of time, opportunity and inducement for the prolonged observations and the dangerous experiments which their determination involves, it is to be feared that they will continue open questions for a long time to come. Our Indian Medical Service has produced men whose services to practical science are second to none, and their ordinary official experience would give them advantages in dealing with plague problems which would not be the portion of any European expert, however eminent; but, as matters stand, such light as we now have on the subject of plague has come to us from other countries. Meanwhile, the work of the Research Laboratory at Bombay is chiefly associated, in the minds of the laity, with the preparation of prophylactic fluid, disseminated over India with results which (so far as this Presidency is concerned) I have endeavoured to appraise in Part VI of this report. The functions of Bacteriological Examiners to be performed by the authorities at the King Institute will no doubt be of the greatest use, but have nothing in common with research work of the kind suggested in this paragraph. I have already alluded (Part III, paragraph 39) to the useful work which District Officers might perform in the way of collecting facts of ætiological significance.

PART VIII.

THE PASSPORT-SYSTEM.

Former epidemics severe, but usually neither long-lived nor wide-spread—Influence of railways on modern epidemics : peculiar position of this Presidency, as compared with other countries—Importance of the passport-system and observation system as a check on the spread of plague over long distances—Non-official opinion—Effect on trade—Success tested by statistics—The possibility of restrictions in the area of operations considered—Difficulties in working passport-issuing offices, frontier stations and systems of patrol—Desirability of exemption of certain classes of the community—Unintelligent working of the system in some towns—No substitute for the present system found practicable : a separate staff essential—The spontaneous action of the villagers found to be fitful : difficulties in recognising such communal action—Village officers form the basis of the operation of the passport-system in rural tracts, but they cannot be trusted to work properly without supervision.

THE discussion of remedial measures now brought to a close has embraced a somewhat wider range of subjects than that contemplated in the division of subjects made in paragraph 3 of Part II: the spread of plague in an epidemic form has been seen to depend largely (almost exclusively) on the action of rats, and it has been shown to be, at any rate, probable that the renewal of epidemics depends in some degree on soil-infection. It further appears that rats play a by no means unimportant part in spreading the disease from place to place, whether spontaneously or by being carried from place to place or through the medium of infected grain. It would thus appear that theoretically the combined action of rats and soil, as conveyers and retainers of infection, would be sufficient, without the assistance of man, to spread plague in an epidemic form all over India.

Previous epidemics not prolonged.

2. Accounts of the progress of the disease in the past, however, do not show that prolonged and wide-spread epidemics have been an invariable or even an usual feature of plague (Manson, 232–3). The characteristics of former attacks would seem rather to have been their extreme violence in a comparatively short space of time and their localization in comparatively small tracts of town or country. Without knowing the manner of regulations adopted in the case of Mediæval epidemics, it is difficult to separate off the various causes which may have checked them in the past: there is, however, one marked difference between past and present epidemics, namely that railways have now provided the population with a speedy means of conveyance all over India, insomuch that a man might become infected in Tuticorin and fall sick in Srinagar. It is impossible not to suspect that the absence of rapid communication in the past and the general restrictions on the movements of the bulk of the population must have stood in a causal relation to the localized and short-lived character of former epidemics. The lesson derived from History would seem, so far, to be that rapid means of communication tends to prolong epidemics, in additon to exerting a fostering influence on the spread of the disease (Indian Plague Commission's Report, V, 388 and 404). In modern Europe, this fostering tendency appears to be more than counterbalanced by a high level of general sanitation and by united and vigorous action on the part of the authorities and the general public. In India, on the other hand, there are influences which tend to promote the intensity as well as the extension of the disease.

Distinguishing element in modern epidemics is their spread by human agency.

3. For the immediate purpose of this chapter, however, I would lay stress on the fact that the element which seems to distinguish the conditions of the spread of present epidemics from those in the past is essentially a *human* element. That the course of wide-spread epidemics frequently follows trade routes is a matter of common observation (Manson, 244; Indian Plague Commission's Report, V, 114). Could we, by any possible device, entirely prevent the spread of infection, through the spontaneous action of human beings, from district to district and province to province, there would be at least a possibility of infection, even if otherwise left unchecked, gradually dying out, as it has done in the past; by sanitary measures (and especially by the destruction of rats), this natural process might be immensely accelerated. The movements of rats, though subtle, are slow, and it seems clear that the permanent infection of the soil is also a very gradual process. If these

were the only agencies to be fought against, a plan of campaign could be deliberated on and matured at leisure. As matters stand, the disease darts hither and thither and the administrative problem of its extirpation becomes more complex every year and changes week by week in the course of the plague season. If, therefore, the present situation be considered, not from the point of view of a single village or taluk but of the Presidency as a whole, the part played by human agency will be seen to be almost as essential to the continuity of the epidemic as that played by rats. How is this situation to be met? The complete destruction of rats and a thorough system of disinfection would, as I believe, deprive plague of its epidemic character in the locality thus treated: this is, perhaps, wholly impracticable and is certainly not immediately practicable; on the other hand, any system of cordon or quarantine by which the spread of infection by means of human beings could be completely checked is at the present stage wholly out of the question (Part II, paragraph 2): we therefore fight, in the language of a high official, "with our "backs to the wall," the early intimation of *each case* of imported plague and the prompt and effective action taken thereon offering the only reasonable chance of preventing each and every case from developing an epizoötic amongst rats in the village in which it occurs, with the resultant epidemic amongst human beings. Disinfection, as I have attempted to show, is at best a somewhat imperfect measure; the spread of infection within short distances mainly takes place by agencies which are beyond our control; early intimation, segregation of the patients and (where possible) complete evacuation of the infected locality are the only measures which can be said to *completely* repay themselves: in big cities especially, where complete and simultaneous evacuation is frequently impossible (Part VII, paragraphs 36 and 37), there seems no certain means of fighting the disease, except by obtaining immediate information of imported cases. Thus, the consideration of possible remedial measures (Parts III to VII) seems to have added considerable weight to the axiom set forth in Part II as to the paramount importance of obtaining early information of cases of plague amongst human beings, as an essential part of our Plague Policy.

Value of a preventive policy.

4. The difficulties in the way of obtaining information of infection and acting on it promptly are many and formidable, nor does our system pretend to meet them all. The disinfection of all the cloths and luggage of travellers from infected localities (Part VI, paragraphs 28–30) and the strict examination of grain from infected localities (Part VII, paragraphs 29–33) have been found to be (unfortunately) almost impracticable. By their agency, infection can be and frequently *is* introduced into towns and villages in the most insidious way, an epizoötic preceding any human mortality whatever. Again, our neighbour Mysore bounds nine of our districts, the boundary line being of the most uneven description and extending over many hundreds of miles. Mysore is without a "policy" in the sense in which I use the term: no measures of any kind are *forced* on the people: wise advice is given them, and they are left to follow it or not, as it seems good to them. Madras, in reference to Mysore, is like a country under a system of strict protection, with a free-trade State (dealing very largely in the commodity which Madras protects) running along its borders: the result is inevitable: there is a constant smuggling of the protected commodity, namely infection, from the one country to the other: to gain a *complete* victory, in the face of such conditions as these, is a task beyond human powers, whence it follows that the benefits of our system are most apparent at a certain distance from the borders of Mysore: eight out of the nine districts bordering on the Mysore frontier are more or less deeply infected indigenously, whilst (except for the borders of Kurnool) not another district in the Presidency has yet suffered from indigenous plague. From this simple fact, I would ask that the broad inference be drawn that our preventive measures, like our remedial measures, have considerable effect, though they attain to nothing approaching perfection and though it is impossible that they should ever do so under existing conditions. In this general conclusion I believe that I have the support of the Sanitary Commissioner, from whose numerous writings on the subject I shall have occasion to borrow, during the rest of the Report, to far too great an extent to make detailed references possible: I take this opportunity of expressing

my respectful obligations once for all. There is little to be said regarding the broad lines of our Preventive Policy, which has not been better said already by Colonel King.

5. Though the case in support of our Plague Policy as a whole is reserved for discussion in Part XI, enough has, I think, been said in the last few paragraphs to indicate that, in spite of its imperfections and the difficulties with which it has to combat, it has been by no means fruitless in the past and that the outlook for the future is not one of unmixed gloom. With a total of plague deaths for 1902–1903 which is equalled by the death-rate of three days in the Punjab, we have no reason to share the despair of the Punjab official (Part VI, paragraphs 12, 13 and 16). The inference to be legitimately drawn from the facts would seem to be that our policy in its broad outlines is the soundest of which the circumstances admit, however much it may be susceptible of improvement in details, and that its lack of *complete* success is due more to the fact that it forms an exception to the policy of India as a whole than to any fundamental defects in the policy itself. A glance at the map and a consideration of the distribution of indigenous plague will serve as a justification for this inference.

The passport-system defined.

6. The passport-system, to which must be attributed in a great degree whatever measure of success or failure has attended our Plague Policy as a whole, has not only been subjected to considerable detailed criticism by my witnesses, but has also been made the subject of scathing attack as a whole, being pronounced "useless," "a costly failure," "a scheme for causing useless annoyance to the "people" and so forth. Yet, what is this terrible system in its essence? It is believed that a traveller from an infected area may retain infection for ten days: he is, therefore, a possible focus of infection during that period (Mr. Graham has noticed a case of incubation lasting for 15 days, but there is no further evidence on this point): the most direct means of meeting this danger is obviously to keep him under surveillance for that period: as he and his family and his neighbours know that any suspicious sickness on his or their part will in all probability lead to evacuation, disinfection and a variety of other consequences, of which they see the immediate unpleasantness (whilst failing to realize or caring little about the ultimate good effected), they cannot be trusted to voluntarily inform the authorities of any sickness which occurs within the period of incubation: the traveller is, therefore, subjected, under penalties, to a daily surveillance for that period. His obligations, in order that the matter may be clear from all ambiguity, are expressed in writing and handed over to him, the written expression of these obligations being the passport: the local authority of the area or areas in which he spends his period of incubation is made primarily responsible for the fulfilment of his obligations, but, all officials being hard-worked and village officials being by no means to be implicitly relied on as a class, it is found necessary to appoint a special class of officers (the observation staff) to see that the obligations are carried out and the responsibilities properly realized. Apart from the simple and direct tendency of these rules, we secure by this agency and system many collateral advantages. The passportee, his fellow-villagers and the village authorities are kept on the *qui vive* and reminded in a forcible way of the possibility of infection being at their doors. Moreover, frequent opportunity is in this manner afforded the villagers of getting the advice and opinion of officers, who, whatever be their faults, have at least some experience of the workings of the disease and some knowledge of its prophylaxis: the source, from which infection is likely to come is indicated in a clear and emphatic way: opportunity is given for enquiry into many relevant questions (for example, into the presence of unusual and mysterious types of sickness), for the examination of the register of deaths and a comparison with the normal death-rate and so forth and, finally, an opportunity is afforded for much talk on matters sanitary, talk which, however little effect it may produce at the time, may at least sink into the minds of some few individuals and thus serve the function of personal prophylaxis (Part III, paragraph 51). In assigning to instruction in general sanitation a secondary part in the rôle of the circle inspector, I have the support of Colonel King (Plague Inspector's Manual, 32).

7. The authorities do not, as a whole, give us any great assistance in arriving at a conclusion on the advantages of a system of surveillance. Sir Patrick Manson speaks of the necessity for cordons and quarantine regulations, where practicable, but his allusion to the necessity for "prompt notification of plague patients" is only parenthetical. The position of India is, in fact, wholly exceptional. In Australia and South Africa, the authorities are dealing with people who have the fullest confidence in them: if there be a portion of the community, representing a low sanitary grade, it is so small and so dependent on the will of the majority that its control is a matter of little or no difficulty. Hence, there is little difficulty in obtaining, with the utmost promptitude, all the information required, and the epidemic can thus be strangled at the outset. A system of surveillance is inapplicable to these countries. Thus, neither the practice of other countries nor the authoritative account of their attitude towards the community can afford us much guidance. The Indian Plague Commission remark that "a system of surveillance depends for "its success on the active and intelligent co-operation of the people themselves." The active and intelligent co-operation of the people would, in my humble opinion, render a system of surveillance wholly superfluous, and such is, apparently, the experience of all the countries alluded to above. I have endeavoured, in paragraph 4 of Part II, to indicate my opinion as to how far popular feeling should guide our policy. As indicated therein, failure is inevitable in the case of a measure, which runs in the teeth of violent popular opposition: that this is very far from being the case, so far as the passport-system is concerned, can be proved in a hundred different ways and is proved effectively enough by the statistics dealt with in paragraph 10 below. The broad facts of the case seem to me to be susceptible of one construction and of one only, namely that the system is far from being superfluous and far from being unworkable. The Indian Plague Commission themselves pronounce it, with all its defects, "one of the most useful measures for "preventing a healthy place becoming infected," and Major Jennings, without reservation of any kind, considers it "a most valuable measure" for effecting that purpose. Major Jennings's opinion is in direct opposition to the principles which appear at present to guide the Bombay Presidency in matters concerning plague, so that he has had better opportunities than any other authority of seeing the workings of a plague policy founded on surveillance and those of a plague policy founded on its negation (Manson, 254, 255; Indian Plague Commission's Report, V, 323; Jennings, 214).

Opinions for and against it.

8. Officials (except in South Canara) recognise, with hardly a single exception, that the passport-system occupies a necessary place in our Plague Policy and that to pull it down, without replacing it with anything better, would be disastrous. Even non-officials are by no means unanimous in inveighing against it. The Rev. Father Müller, Dr. Oliver and Mr. Ranganátha Mudaliyár are amongst its opponents, but the Rev. Mr. Chamberlain, Mr. Krishnamácharlu (Bellary) and Mr. Giri Rao (Madanapalle) support it. Father Rondy admits its utility in towns, whilst inveighing against its use in villages. The Chairman of the Gooty union, though strongly conscious of the annoyance caused by it, admits that its objects are good and that, as a representative of his town, he would like to know of all arrivals who were likely to convey infection. Amongst officials, the members of the Madras Conference and the Secretaries of the Vellore and Adóni Municipalities are perhaps the most enthusiastic adherents of the system: Mr. Dance, whilst complaining of the unintelligent way in which it is worked, has not a word to say against the system itself: Colonel Benson (writing from the unsympathetic regions of Bangalore) supports the system, as also Mr. Saldanha in South Canara: Mr. Campbell, a somewhat destructive critic of our measures, considers that it would be hard to improve on it. The Kolar authorities, whilst considering it best suited to confined localities, where it can partake of the nature of a cordon (I admit that it can be worked with *exceptional* success under such conditions), concede that, if a fair proportion of travellers are inspected by means of this system, it cannot be pronounced a failure. The Nilgiri Conference was divided in opinion. Mr. Scott, Dr. Lubeck, Mr. Lobo and Mr. Giri Rao emphasize the necessity for relentless prosecutions and deterrent punishments for evasion, if the system is to attain the maximum amount of success.

9. The opinion of enlightened members of the Merchant Community and of Railway Officials is of the greatest value in a matter of this kind. I have had the advantage of being favoured with the opinions of the Chamber of Commerce and of the leading officials of our principal Railways. From their communications (printed in Appendices VI and VII), it will be apparent that the dislocation caused to trade is insignificant or non-existent and that it would be ridiculous to compare with the magnitude of the advantages gained any slight personal inconvenience to which individuals are now subjected (though this might, I think, be lessened in some degree without danger to the community—*vide* paragraphs 20–24 below). No railway official, except Dr. Oliver, condemns the system as a whole, though many of the railway officials consulted have given me valuable suggestions for rendering it more efficient or more popular. The Chamber of Commerce adverts to the "remarkable immunity from the disease which this Presidency has hitherto enjoyed" and "considers that the Plague Regulations and the protection they afford are "probably one of the main causes contributing to this happy result. For this reason, "it holds that the expenditure that is being incurred on plague preventive measures is "justified, so far as Madras and its neighbourhood is concerned." A more cordial and weighty appreciation of the sagacity and success of the Plague Policy obtaining in this Presidency could not be desired. No witness has suggested, in the course of my tour, that climatic influences have anything to do with the immunity from plague now enjoyed by the greater part of the Presidency including Madras City (*vide* Part III, paragraph 47).

Its interference with trade insignificant.

10. Whilst strongly convinced that the best justification for the passport-system is to be found in the recognition of the success of the Plague Policy as a whole (of which recognition I have given a conspicuous instance in the last paragraph), I am perfectly willing to stand by the test of statistics as a partial indication of the degree of success which has attended it. Statistics as to its working from September 1903 to May 1904 have been supplied by most of the infected and threatened districts and will be found in Appendix VII. I would invite attention to column 8 of that statement. The percentages are lumped for the municipal and non-municipal tracts of each district. It will be observed that, except for seven municipalities, the percentage of persons actually examined for the full period of ten days is over 50 per cent., whilst in the majority of cases it is two-thirds or more. Translated into facts, what does this mean? The danger lies in the chance of a few people, out of those who leave infected areas, developing plague. The system enables the authorities to inspect two-thirds of these people and thus ascertain their health in the simplest and most natural way possible. In the case of those whom the authorities, for one reason or another, do not see for the full period of incubation, it enables them to exercise and get the benefit of all the various collateral checks indicated in paragraph 6 above. It may be said that a system which produces these results is not a *perfect* check against the invasion of an epidemic: I grant it, and such is the lesson of facts: neither is the inspection of a Revenue Inspector a perfect check against fraud, nor the work of the Constable a perfect check against crime: but, that the passport-system is a tremendous power in the direction of averting and checking the invasion of plague, seems at least equally obvious and such, I submit, is also the lesson taught by the results. I have taken that portion of the statistics, which is practically incontrovertible, as the basis for this deduction, but, in doing so, I have undoubtedly done an injustice to the system, though I am unable to fix the precise extent of that injustice. For example, column 9 of the table, in every district in this Presidency except South Canara and Malabar (rural), shows the number of passports disposed of by means of complete examination, by exemption, by transference to another district or in some other legitimate way as over 80 per cent. This is not a completely safe guide (as will be shown below), but I think it would certainly be fair to assume that over two-thirds of the passports in this Presidency (with the exception of those in South Canara) really effect, in the most direct possible way, their intended object.

The results are the best argument in its favour.

Lesson from statistics.

11. South Canara is the district from which comes the most strenuous depreciation of the system as a whole, but the figures hardly bear out this pessimistic view. Doubtless, in Mangalore town, the results are bad, but in Mangalore taluk (which accounts for the enormous mass of the passports issued), column 8

shows that nearly two-thirds of the passportees have been kept under observation for the whole period of incubation. If it be considered firstly that the weekly death-rate from plague in Bombay City within the last six months has on more than one occasion been higher than the death-rate (906) for plague in South Canara for the whole of the year 1902–1903, secondly that this result must be ascribed, at any rate in part, to the direct and collateral advantages which the passport-system confers on the authorities in tracing out cases of plague in non-infected areas and lastly that the passport-system is the only means at present in force by which they could hope to get such early intimations, I think that it will be apparent that, relatively unsatisfactory as I fully admit the working of the system to be in that district, it has thoroughly justified its existence even there. That the inconvenience to the people is great must be freely conceded, and I have carefully considered all suggestions by which that inconvenience can be minimized with due regard to efficiency, but the residual minimum of annoyance has to be loyally accepted as an indispensable part of the plague policy, if that policy can be shown to be successful as a whole. I concede that on the West Coast the system of farm-houses and the absence of villages in the usual acceptation of the term put exceptional difficulties in the way of working the system, but these difficulties do not appear to have prevented the achievement of fair results in South Canara, as also in Malabar, where the conditions are similar. In some respects, the West Coast seems to demand exceptional treatment (Part IX, paragraphs 13 and 41).

12. It has, however, been represented that it is not the people who *do* report themselves that it is important to know about, but the people who do *not* report themselves. This argument seems to rest on a slight confusion of thought. From a police point of view (and no doubt also from the point of view of setting an example), it is particularly desirable to find out the persons who evade our rules: but, from a preventive point of view, all that the authorities require is to have possible cases of plague under their eyes. There is no statistical connection that I am aware of between a tendency to evade the Passport Regulations and a liability to contract plague. It must, therefore, be assumed that the persons who present themselves daily for observation are just as liable to furnish their quota of plague cases as those who do not. The Sanitary Commissioner's remarks, in paragraph 9 of his report printed in G.O., Nos. 198–199-P., dated 27th January 1904, deal with the probable effects of the system on the welfare of Madras City in a particularly instructive way, showing that the benefits conferred are real and important, even on the assumption of probable failure on the part of the authorities to detect an occasional case of plague. In paragraph 5 of the same communication, some statistics are given as to detection of plague cases by the direct agency of the passport staff. Some statistics have also been given me on this point by Mr. Pinhey, Mr. Robertson, Major Leet Palk and Mr. Krishnamáchári (Mangalore): they will be found in Appendix VI (*vide* also the Madras Conference). These statistics have their value, but I would submit that the case in favour of the passport-system does not rest wholly (or even chiefly) on the amount of direct *detective* work done by the sanitary staff: if their influence is not mainly and pre-eminently *moral*, they are not worth having: the system may, in a broad sense, be held to stand or fall by the extent to which it has resulted in the detection or concealment of cases, but certainly not by the extent to which this or that subordinate has displayed the qualities of an embryo Sherlock Holmes. Apart from the question of expense (which would by itself be decisive), a department formed on the model of the Salt and Police Departments for the *detection* of plague cases would be wholly alien to the spirit of our Plague Policy, and it may be safely predicted that the result would be disastrous: an organisation that falls short of this must rely mainly on tact, suasion and incessant appeals to the common-sense of the more intelligent members of the community. From this point of view, the cases that come to light *spontaneously* are really more encouraging symptoms than those which are discovered by the staff itself.

Should the system be confined to towns?

13. The opinion of the majority of those who are opposed to the passport rules is that they are of more use in towns than in rural tracts. Mr. Macleod, Mr. Carr and Mr. Rice favour this opinion. This may perhaps be so, though the statistics seem to show that the system works more successfully in villages than in

towns. I have checked a large number of passport-examining offices in the course of my tour and, seeing the slip-shod and unintelligent way in which they are frequently worked, I have felt an ever-increasing wonder at the degree of success which has attended the system. Detailed criticism will fall into its proper place later on in the report, but here I would simply observe that the passport-system is best worked on a basis of minute acquaintance on the part of the staff with the habits of the residents within their jurisdiction. Such acquaintance is far harder to acquire in large towns than in smaller places: one would, therefore, expect *a priori* to find the defects most pronounced in big towns, and such is the inference which seems to follow from the statistics. The Plague Commission (page 323) observe that it is not so easy to enter a village unobserved as to enter a town unobserved. The Guntakal Conference emphasises the same view. Captain Gabbett considers that *in towns* attention is more profitably given to the inspection of the sick and corpses than to the passport-system. This last point will be dealt with in Part X.

14. This is, perhaps, a suitable place in which to deal with the position of those who would confine the operation of the system to travellers by railways, to big towns, to uninfected areas, to Madras City and so forth. The proposal to restrict the scope of our operations to the Presidency town, or in other words to deliberately abandon to the horrors of plague twelve districts which we have protected with perfect success for five years, seems to carry its refutation on its face. The proposal to restrict the passport-system to railways seems open to almost equally obvious objections. Doubtless, it is easier for a traveller by road to avoid taking out a passport than for a traveller by rail: similarly, it is easier to escape detection, if murder is committed by poisoning than by stabbing: is this a sufficient reason for *allowing* murder by means of poison? Or, take a concrete case. Z (an uninfected town) is 20 miles from X (an infected town) by road: the traveller can also reach Z, by train from X to Y (16 miles) and by road from Y to Z (8 miles). A prefers to travel from X to Z by road. B prefers to travel by rail and road: why should B be subject to examination and A escape? Why should railway travelling be deliberately penalised and every possible incentive given to road-travelling, simply because the latter is (by admission) the method by which there is most possibility of evading the system? Again, it is proposed to abandon the system except in the case of big towns. Here again, the reason for abandoning the system in rural areas, in which it has been worked with conspicuous success, is not obvious: moreover, the abolition of the system up to the gates of each town would open the door to obvious means of evasion, which would place the town itself in a state of siege. In fact, as observed at the Salem Conference, "the "system has to be looked at as a whole and it would be difficult to separate off "any particular area from the sphere of its operations." I feel convinced that the spear of this reasoning will pierce every proposal, which seeks to limit the sphere of operations of the system by the exclusion of particular tracts, large or small, few or many. The disadvantages of such limitations, even when inevitable, are illustrated by Mr. Warren's evidence regarding a merchant who is in the habit of giving his address as Pondicherry in order to escape the operation of the passport system (Madras Conference).

Objections to confining the system to travellers by rail

or to big towns

15. The proposition to restrict the area of the operation of the system to uninfected *areas* or, in other words, to declare tracts of country instead of villages as units for the operation of the passport system has found considerable favour in the Bellary district. It received some support at the hands of Mr. Carr and (unofficially) of Mr. Cowie: Captain Robb and Mr. Graham are also in favour of imposing some such restriction on the system. I by no means overlook the relatively small advantage gained and the relatively great inconvenience caused by inter-passporting in deeply infected tracts. As between villages and villages, however, I suspect that the inconvenience is formal rather than real, for reasons given in paragraph 33 below: apart from this, let me endeavour to reduce the suggestion to practice. Supposing nine-tenths of a taluk affected, there would be a strong case for regarding the whole taluk as an infected area and notifying it *en bloc*. There would then, as pointed out by the Salem Conference and by the Hon'ble Mr. Andrew, be an obvious injustice to the uninfected villages, which would share in the

or to uninfected areas.

common ban, in spite of having (perhaps, through their own exertions) kept the disease out of their own precincts: not only would they have to take out passports but they would also be bound to receive villagers from really infected villages, without the privilege of keeping them under any sort of surveillance. I fancy that the "privileges," if claimed, would be met by a refusal of a rough and ready kind, but the object of our policy is, as far as possible, to run in the current of popular sentiment in this matter and certainly not to leave the prudent *legally* at the mercy of the imprudent.

Difficulties of confining the passport-system to uninfected *blocks*.

16. Supposing that the uninfected villages were carefully excepted and the *remainder* of the taluk declared infected *en bloc*. It is plain that the block would then be of a very irregular and artificial kind and that the system of passporting within the block would be rendered most difficult and unsatisfactory, though the total number of passportees would be reduced. Even at present, the head of an infected village may find it difficult always to know when a villager is leaving his village, but how much greater would be his difficulties in finding out whether the villager were leaving an infected *block?* Nothing but a system of passport-issuing offices *round* the block would be sufficient to meet the difficulties which would arise, and such a system would, as it seems to me, create as many troubles and difficulties as those which it was designed to cure. Whatever arrangement was made, an infected *block* of this description would be a far more formidable menace to the safety of the surrounding country than the individual villages of which it is composed constitute, when considered separately. Colonel King has dealt with this question forcibly in paragraph 8 of his report quoted in G.O., No. 878-P., dated 12th June 1899.

17. Another objection to the proposal came from within the limits of the Bellary district itself. As observed at Hospet and Adóni, an infected area consisting of several units has not necessarily that identity of interest which must be assumed as the basis for the scheme. It is, in fact, frequently necessary to protect one set of villages against another set of villages, though both may be technically infected. Plague may be raging at one end of the group and subsiding at the other end. This difficulty could of course be met by extreme watchfulness on the part of the local authorities and incessant revision of the area of the blocks, to meet the exigencies of the moment; but the amount of trouble involved and the necessity for incessant references from the district officers through the Collector to Government and the dangers of delay would, I fear, prove an invincible obstacle to the scheme of clubbing villages temporarily, in whatever form it might be devised. The scheme would be most feasible, if confined to small groups of villages, which, could be worked by one village headman as passport-issuing officer, but, even under these conditions, I am not sanguine as to its success (*vide* G.O., No. 827-P., dated 6th June 1904).

Ways in which travellers may be passported.

18. Broadly speaking, there are four ways in which a traveller may be passported (1) before his departure from his village or town, (2) on arrival at his destination, (3) at some intervening railway station and (4) in the course of his journey by road. With the first three methods I have no quarrel: the first is the most advantageous, though the second is the surest: the third is the most suitable method as regards big towns and is always an useful supplement: the fourth method seems to be open to grave objections. Almost all the officers consulted on the point are agreed as to the uselessness of passport-issuing offices on roads. Mr. Carr and Mr. Dutt have discussed this and other questions at some length: their views will be found in Appendices VI and VII. In the first place, such offices can be easily evaded: in the second place, it is impossible for the passport-issuing officer to check false names and false addresses: in the third place, the person dignified by the name of passport-issuing officer is usually a specimen of the lowest possible member of the literate class, retained for a doubtful period on a pittance of 10 rupees and reinforced by a temporary constable (belonging to a class designated in Adóni as "riff-raff") and naturally open to pecuniary inducements of the most modest nature. These passport offices have been denounced in Bellary, North Arcot, the Nilgiris, South Canara and Anantapur, and no part of the organization tends to throw so much odium and ridicule on the system as a whole. Captain Cornwall, on inspecting a passport-issuing office, found the place deserted, though a clerk and a special

Uselessness of passport-issuing offices on roads

constable were supposed to be on duty. There can be no proper supervision over subordinates of this class in rural tracts. At the Vellore Conference, I was told of a regular toll of two annas being levied from travellers, the proceeds of these exactions being divided equally between the 7-rupee clerk and the constable (*vide* the Vellore Conference, Head "Plague Police"). Mr. Brodie also speaks of these clerks as being specially corrupt. The same argument, in my respectful opinion, applies to frontier stations and systems of patrol of every description. There are, I think, a few frontier stations still left in North Arcot and their abolition would, I believe, be in accordance with the sentiments of the local authorities. Rural and urban passport-issuing offices are scattered here and there over all the infected districts. In June, I came across one near Méttupálaiyam, issuing passports from north to south and from south to north. The office in question had not prevented plague spreading from a village 4 miles south of Méttupálaiyam to Méttupálaiyam itself, though it was situated between the two villages. If the village headman is over-worked, it is certainly desirable that he should have a gumastah, but an independent passport-issuing office is, as it seems to me, useless under ordinary conditions. Any change in the direction just indicated would necessitate a corresponding alteration in sections 53–5 and 86–7 of the Plague Regulations.

and of frontier stations.

19. There is one case, however, which needs separate consideration, namely that of passport-issuing offices stationed at the gates of large towns. These may be intended to serve one of two alternative objects, either to guard an uninfected or mildly infected town (the most general case) or to guard the surrounding villages from an infected town (as in Mangalore). Unless they are useful for the *former* purpose, I have no hesitation in recommending their abolition. It is plainly impossible for a passport-issuing officer to know in what direction a person leaving the town is going or when or where he will stop: he must simply take such answers as the traveller chooses to give him. So far as persons coming into towns are concerned, he is in a rather more favourable situation than in the converse case: he can make enquiries with some hope of success, if he chooses, and I am decidedly disposed to support the suggestion of the Tahsildar of Hindupur that a passport-issuing officer should have the power to insist on a surety being produced, if for any reason he suspects the genuineness of the address given: but, if the system is to be of any use, it must be worked with a better class of men than are often employed at present: considering the difficulties and temptations attendant on the post, I consider it is impossible to get a man, who will not be worse than useless, for less than 25 rupees a month. For this salary, it should be easy to put a respectable and intelligent Revenue Subordinate on deputation or to obtain the services of a respectable pensioned officer of fair literary qualifications: a knowledge of the town and a good character should be essential: with these guarantees and with the additional precaution of constant scrutiny from the Revenue, Plague and Municipal authorities, there is no reason that I see why the system should not prove a fairly valuable auxiliary to the observation staff as regards persons *entering* the town: men of the status proposed could also be usefully employed in the examination and desiccation of grain suggested in paragraph 31 of Part VII: to make them really useful, I think that they should undergo the training suggested, in the case of assistant inspectors, in Part IX, paragraph 39: I am respectfully but strongly of opinion that, except under these conditions, every road passport-issuing office and frontier station in the Presidency might, with advantage, be abolished (*vide* also paragraph 32 below). I attach equally little value to any system of *patrol* outside indigenously affected towns or areas. Such a system has all the defects of a cordon, without its advantages. I am supported in my views as to the proposed status of Passport-issuing officers by Colonel Pemberton, the Rev. Mr. Chamberlain, the Rev. Father Müller, Mr. Blake and the Secretary of the Vellore Municipal Council, all of them gentlemen of considerable experience in plague matters. I may also claim the authoritative support of G.O., No. 775-P., dated 24th May 1904, for the views laid down in this paragraph.

Value of passport-issuing offices at the gates of towns.

Systems of patrol useless.

20. Non-official witnesses, as a body, are more impressed with the annoyance entailed by the passport-system than with its advantages, and there is, perhaps, some ground for sympathising with their point of view. In towns, the office of

Views of non-officials on the passport-system.

passport-examining officer is usually held by a hospital assistant, and my experience of these men is anything but favourable. They are, as a class, stupid, apathetic, mendacious and (sometimes) impertinent. My inspection notes, to which I shall have occasion to refer in due course, serve to illustrate and justify these asseverations. I can hardly suppose that a class of officers, who present themselves in such an unfavourable light to an inspecting officer, before whom they will presumably be on their best behaviour, will display any great amount of promptitude or consideration in dealing with passportees. Complaints are rife as to the detention at these offices, which, as I have seen myself, usually contain little accommodation for the throng of passportees who stand waiting their turn with ill-concealed or unconcealed impatience. Probably the respectable inhabitants generally secure exemption by an appeal to one of the officers empowered to exempt them under note 2 to section 2 (3) of the Plague Regulations: the crowds that I saw outside passport-examining offices came from a humble rank of life. Suggestions have been made as to the possibility of relieving the strain on passport-examining officers by allowing the village officers or the sanitary staff to perform their duties in the alternative, but these suggestions were negatived by the official witnesses present (Anantapur and Guntakal Conferences). I would respectfully suggest that, where such a course is possible, the hours of examination should be extended to eight hours in the day and that, when there is any pressure of work, a clerk should be given the hospital assistant to assist in the work of examination. It seems a pity that a better class of men cannot be deputed to this kind of work. I may add that I have always read the note quoted above as allowing the exemption of the passportee *unconditionally*, whilst giving the exempting officer the option of having the passportee examined at his residence, if he thinks fit to pass an *additional* order to that effect. I am certainly in favour of a power of giving exemption being granted in the sense indicated above, but would suggest that in any case the matter be made clear of possible ambiguity (*vide* Mr. Knapp's evidence). As regards the status of the passport-examining officer, I shall have a few observations to submit in Part IX.

Advisability of granting general exemptions

21. Apart from these palliatives, the time seems to have arrived at which the question of general exemptions may be profitably considered. The inconveniences which the passport system involves on a large number of well-behaved citizens can, I think, be justified on one plea only, namely that these persons would not be likely to have the authorities informed of any sickness with which they might be visited within the period of their incubation. There are three classes, at any rate, with regard to whom such probable failure to give information can hardly be predicated, namely respectable Europeans, native gentlemen of position and officers of some rank in the service of Government and of the Railway Department. Take, for example, the Revenue Department. The head of an infected district, who is responsible for its whole plague administration, if he goes to Madras, is bound to repair to a police Tannah for ten days, unless exempted by the municipal authorities: the same argument applies to a Special Plague officer or Supervisor: if these officers can be trusted to administer the plague policy of large areas, they can, I apprehend, be trusted to conform to the simple rule of having any case of sickness on their own part reported. Officers of other departments of equal rank are presumably equally entitled to confidence. In any case, one and all of these persons, if they fail in their duty, are departmentally liable, and such failure could not possibly be kept secret. Railway officers could, I apprehend, be bound down without difficulty by similar liabilities, and a general exemption in their case would save the entirely formal and somewhat wearisome proceedings, which take place at intervals under the present system, large batches of exemption forms being sent in duly filled up by the railway authorities and returned duly signed by the Collector, the latter having presumably not the smallest idea of the personal qualities of the person for whom he signs certificates: I can certainly answer for my own ignorance in the case of the large number of employés whom I have exempted. I venture to submit that the principle, which underlies such general orders of exemption, might without any detriment to efficiency be formally recognised and would respectfully suggest that all permanent Government and Railway Officers, who hold or officiate in appointments carrying a salary of Rs. 100 a month or more, be exempted *ex-officio* and *personally* from liability to inspection, detention or examination of any kind under the Plague

to Government and railway officers,

Inspection rules, unless found to be suffering from plague or to be "contacts" of persons suffering from plague. As plague patients, they would, of course, be bound to submit to any measures which might be found necessary to ensure their isolation from the community: as contacts, they and their luggage would have to undergo such a measure of disinfection as might be found necessary to protect the community from all danger of infection.

22. The same arguments seem to me to apply with increased force to the case of respectable Europeans and Eurasians. I confess that I am wholly unable to conceive what useful purpose can be served by compelling such persons to go to hospitals or police stations to submit themselves to examination, when it is perfectly notorious that any one of them, the instant he became ill, would at once send for a qualified physician, whose professional etiquette (apart from other considerations) would not allow him to hesitate for a moment in giving information to the appointed authority. For the purpose of this suggestion, I think that "respectable" European or Eurasian might be taken to mean an European or Eurasian who travels first-class on railways. Almost all the passporting of Europeans and Eurasians is effected at railways, and it seems to me that this would be a simpler definition than one that depended on the Income-Tax Act. It has been suggested that such a proposal might arouse racial animus. This is an aspect of the question which it hardly comes within my province to discuss at length: my suggestion is simply intended as a particular case, illustrating the general principle that it seems unjustifiable to subject a class of persons to annoyances, when no possible harm could ensue from freeing them from those annoyances. If there be any *general class* of native gentlemen who habitually and as a class employ qualified medical practitioners, when they fall ill, I would gladly support the exemption of such a class: but I have no evidence of its existence. Further, the general sanitary conditions in which Europeans and the better class of Eurasians live are not such as to render them in any way susceptible to plague (Part III, paragraph 49 and paragraph 2 of this chapter): I can see no reason why this fact should be ignored; there would almost seem to be an inconsistency between the enforcement of European ideas of sanitation and the refusal, in practice, to recognise any distinction between the class which practises them and the class which does not. In my respectful opinion, this point of view has more relation to facts and common-sense than arguments for their attendance based on the "force of example", which have been cited to me by some persons. If these arguments were pushed to the full length, nobody should be exempted from personal attendance at a passport-office under any circumstances whatever. The form of exemption which I would suggest is the same as that already recommended in the case of officials. My views as regards Europeans and Eurasians have the support of the Madras Conference, of the Agent of the Madras Railway and of the (South Indian) Railway Conference at Trichinopoly: Major Ffrench and Captain Cornwall have expressed themselves in favour of the suggestion, and Mr. Dance thinks that no possible harm could come of it, so far as the spread of the disease is concerned. In practice, any European, even now, could be exempted at once from personal attendance at a passport-office, if he chose to apply for such exemption. I have exempted many, myself, as Collector. The recognition of the principle underlying these individual exemptions would save all further trouble in the matter. In addition to conferring immunity on respectable Europeans as a class, Government might, at the same time, be pleased to reserve to itself the right of exempting individual native gentlemen of rank and position for life from the operation of the rules and, in my respectful opinion, the occasional exercise of such a power would be much appreciated by the recipients of the privilege.

to respectable Europeans and Eurasians

and to natives of position.

23. Having spoken of the support given to the suggestion by the second Trichinopoly Conference, I should perhaps add that Dr. Oliver, in a subsequent communication, dissociated himself from the views of the majority, partly on the ground that the class in question contains many "Amateur Doctors", but chiefly on the ground that they cannot be trusted to look after their servants properly. This raises a totally different issue. The exemption which I propose is purely personal. The European or Eurasian would be exempted *qua* European or Eurasian and the official *qua official*. The families and servants of officials

(*qua* officials) and the servants of Europeans or Eurasians would continue to be passported and subjected to the general rules, exactly as they are now, so far as my recommendations are concerned, nor do I conceive that it would be safe to extend the privilege to this class of persons. So far as native officials are concerned, I have already submitted that their position as Government or Railway servants is a guarantee, but to extend their privileges and responsibilities to relations, servants and so forth would raise more difficulties than it would allay. The same applies to the servants of Europeans and Eurasians: Europeans and Eurasians cannot be supposed to be responsible for the actions and the whereabouts of their servants to the extent which would justify the authorities in relieving themselves from responsibility in the matter: I may add that, in regard to servants, the opinion of the majority of the officers consulted by me agrees with my own. It is, of course, open to any of the officers empowered by the regulations to exempt servants (or anybody else) from personal attendance at a passport-station, though it is a privilege which I, personally, have always refused to grant, on the grounds stated above.

Alterations proposed in the present rules regarding exemptions.

24. Respectable non-official Hindus, whose business (as merchants, pleaders and so forth) necessitates their travelling (apart from those who may be exempted for life in the manner suggested in paragraph 22) can even now be exempted by Collectors, under section 89 (2) of the mufassal rules, from taking out passports under the passport rules. Apparently, some ruling is required as to the exact effect and duration of such exemptions. I am not quite clear as to whether their exemption would leave unaffected the liability of such persons to submit themselves to the operation of the plague regulations to the extent suggested as desirable at the end of paragraph 19 above, nor do I find anything to empower the Collector to withdraw such an exemption, when it is once granted. It would seem desirable that such exemptions should be granted with some freedom to non-officials, with whom the Collector was acquainted, and that they should last until the end of the calendar year in which they were granted, unless revoked by the Collector at any earlier date. All certificates granted by the Collector should, I think, apply all over the Presidency, being granted not in relation to the state of any particular district but to the Collector's knowledge of the personal character of the person exempted. I have known of cases under the existing rules in which officers with extensive ranges have had to get exemption certificates from half a dozen different Collectors. This seems anomalous. Whether the exception made as regards Madras City in G.O., No. 246-P., dated 3rd March 1904, should continue to apply is a matter on which I abstain from expressing any opinion, but would only note that I personally am not in favour of any system of exemption which requires a person to be responsible for his servants or dependants or, in fact, for anybody but himself. The suggestions embodied in this and the preceding three paragraphs seem to exhaust all the exemptions from the passport rules which can be allowed, consistently with the strict maintenance of the objects aimed at.

Suggestions regarding passports.

25. Mr. Fotheringham suggests that persons, whose work keeps them incessantly travelling from an uninfected to an infected area and back again, should be allowed, if they prefer it, to take out 100-day passports, which should only require their attendance on alternate days. Such cases seem sufficiently covered by section 83 of the regulations, and I should be disinclined to increase the number of different kinds of passports or to grant any special indulgence to persons whose habits make them a constant danger to the community. I am, of course, assuming that they are not suitable persons for exemption. I may add that no cases of this kind have been brought to my notice in other districts. Colonel Pemberton and Mr. Knapp suggest that every person should hold a species of passport in the European sense of the word, *i.e.*, a certificate of identity. I have given the suggestion due consideration but cannot see my way to supporting it. Mr. Walsh suggests that, in the absence of the village headman, the kurnam should be empowered to sign passports (in villages, of course, where there is no other local authority available), and observes that otherwise the passportee has no means of complying with the regulations, when the headman is absent at the taluk head-quarters or elsewhere: this suggestion has my support. Captain Niblock has drawn attention to the

excellent effect of using thumb-impressions on passports, and Mr. Dutt has made some detailed suggestions as to the desirability of co-operation between the railway and the passport authorities. These suggestions were circulated to various officers for their remarks. The correspondence is printed in Appendix VII. As regards Mr. Dutt's suggestion, the important point is that no one proceeding from an infected locality should be able to get a ticket without the production of his passport, and this appears to be already the rule, so far as Bellary is concerned. It needs the co-operation of the railway authorities. The Adóni Municipal Secretary's evidence contains some useful notes on this point. The question of opening registers is a matter of administrative detail, which each district officer is competent to settle for himself. I fear that the adoption of Captain Niblock's suggestion in regard to thumb-impressions would predicate a standard of intelligence, which is not attainable in a system, which has, in a great measure, to be carried on through the medium of the headmen of villages. Mr. Dance speaks very strongly about the unnecessarily long time for which some places (*e.g.*, Arkonam and Coonoor) have been retained on the infected list to the annoyance of passengers, after infection had subsided: he observes that such unnecessary restrictions turn the system into a farce and alienate native sympathies. Mr. Giles observes that notifications removing places from the infected list are only communicated to the Railway authorities after considerable delay. I observe that Colonel King, in paragraph 14 of his report printed in G.O., No. 270–271-P., dated 5th March 1903, alludes to the diversity of practice in this matter. There is, in my respectful opinion, considerable force in these various observations, but these seem to be matters of a purely administrative nature, in which hard-and-fast rules could not well be laid down. As to the extent to which plague rules can with advantage be fixed or left *fluid*, I shall have some suggestions to submit in the next chapter. Many other points of detail have been brought to my notice by various officers, but I hardly think that any of them call for remarks in a report which must necessarily be confined to considerations of a general nature.

Railway inspection stations.

26. A word may be added about railway inspection stations; they have been forcibly defended by Colonel King, in the course of the Plague Administration Reports for 1901–1902 and 1902–1903. The remarks of the Collector of Salem, embodied in the same reports and dealing with the railway inspection at Jalarpet, have been most laudatory. Major Jennings's views on the necessity for railway inspection are expressed at considerable length and in great detail and are the fruits of that officer's personal experience as well as of general observation (pages 211–212 and 215–224; *vide* also the Indian Plague Commission's Report, V, 114-115). Official testimony on this matter is nearly unanimous, and many officers fully admit the importance and practicability of railway inspections who are unwilling to allow the passport-system any other merit whatever. I have printed, in Appendix VII, Dr. Lubeck's statistics, tabulating the work done at the Jalarpet inspection station; these tables show clearly and conclusively the valuable services which the work performed at that station has rendered to the Presidency in the course of the last four years. Guntakal station was not working very satisfactorily at the time of my inspection, but will, I believe, be soon put into good order by Mr. Gibson. Hindupur I did not visit. Perambur, Erode and Trichinopoly are all in admirable working order. I fully realize the inconvenience caused to Traffic Managers by the system, but I am bound to submit that in no other sphere is the passport-system doing work at once so admirable and so necessary as on railways. It is chiefly to railways that the rapid spread of plague over vast tracts of country must be attributed (*vide* paragraph 2 above), and no efforts can be too strict in the direction of surveillance of passengers by railway travelling from across the frontier or from infected to uninfected tracts within the limits of this Presidency. In this view I always had the support of the late Mr. Annaswámi Mudaliyár, who, in his double capacity of Municipal Chairman and railway official, was singularly fitted to judge of this matter from all points of view. The great difficulty is to check false addresses and fraudulent re-booking: Dr. Lubeck and Mr. Annaswámi Mudaliyár have written notes on the question of re-booking, which will be found in Appendix VI and will doubtless be of help to other officers. It has been suggested by several officers (including Mr.

McCloughin, the Traffic Manager of the South Indian Railway, and Mr. Annaswámi Mudaliyár) that telegraphic intimation should habitually be sent from railway inspection stations, giving intimation of the arrival of passportees at their destination. I consider that this would be a most material improvement, the late receipt of the ordinary intimation slips being a fruitful source of confusion and uncertainty. I think that such a practice might with great advantage be introduced in districts which are not infected: in infected districts, the strain on the telegraph officials would render such a measure out of the question: the recommendations having been strongly supported at Trichinopoly, it might perhaps be tried as an experimental measure at that inspection station and at Erode. Sections 5 and 9 of the Plague Regulations embody the existing rules on the subject. Mr. Pinhey, Major Leet Palk and the Tahsildar of Hindupur suggest that passports, in cases of change of residence, should, in all cases, be, as far as possible, sent *direct* from examining authority to examining authority. This is most essential. Major Bonham-Carter deprecates the prohibition under section 40 of the Plague Regulations of issue of tickets for *whole districts*, on the occasion of feasts, when only a village or two in the district is really infected. Unfortunately, the suggestion reached me too late to be embodied in the subjects for my conferences. In any case, the proposal does not involve any general change in the rules, but is simply a plea for discretion in their application: viewed in this light, it has my support.

The work of passport-issuing and examining offices criticised.

27. In the course of my tour, I inspected a considerable number of passport-examining offices and some passport-issuing offices. I have already commented on the general uselessness, as it seems to me, of passport-issuing offices. Merely by way of illustration, it may be observed that it would require at least a dozen such offices to completely protect Ootacamund against heavy traffic and that it would take a brigade of troops to ensure that no person came into the town on foot without a passport. Ootacamund, however, affords a particularly favourable example of the use of passport-issuing offices, hospital assistants or respectable and moderately well-paid men being in charge of them and their object being to protect the town and not the country. They therefore form a fairly useful supplement to an energetic staff working within the town. So far as the work of the passport-examining officers is concerned, I feel bound to submit that in many cases the passport-system is not being given a fair chance. I have taken a tolerant view of the matter. The Sanitary Commissioner, who has kindly favoured me with his notes of inspection of one or two towns, makes the sending of *daily* lists of absentees a *sine quâ non*. Theoretically, it should be so, but, practically, I think that there is some excuse for not sending a list of 50 absentees, of whom 45 will turn up next day, and making the sanitary staff waste time in hunting them all up. I should be content if the list were even sent every two or three days and an honest attempt made to hunt up all absentees *and all those who announce change of residence* and the result reported within (say) a week: but to see the sanitary staff with lists of *more than a month old* unchecked is discouraging, and this has been by experience in more than one town. It is merely a matter of detail, but it is one which strikes at the very root of the success of the system. In some towns (*e.g.*, Coonoor, Trichinopoly, Bellary, Kurnool, Anantapur and Arkonam), really systematic attempts are made in the direction of detecting evasions, but at most of the places, whose work I examined, a large proportion of the passportees simply announce their intention of proceeding elsewhere, whereupon their statements are accepted without an attempt at verification, nor is there any system to ensure *early* enquiries into and reports on the whereabouts of defaulters, absentees and persons who announce their intention of changing their residence. In this connection, I may note Mr. Ranganátha Mudaliyár's story of the passportee, who announced his intention of proceeding to Athiyúr, stayed in Tiruppattúr surreptitiously, was detected after he had shown symptoms of plague and died in Tiruppattúr, two days after which his passport came back from Athiyúr *duly verified by the village munsif.* Such a case shows the care which is necessary in checking the statements of passportees as to their intended departure from a place—an obvious device to escape the inconvenience of appearance at a passport-office and one which only needs the connivance of a friendly or mercenary village headman. I attribute the unsatisfactory features in the work of checking defaulters, etc., mainly to the

character of the staff employed, a matter which will receive full consideration in Part IX, but the general defects of *system* elicited by my enquiries should not, I think, pass wholly unnoticed in my review of the working of the passport-system. In some towns, attempts are made (or said to be made) in the direction of house-to-house inspection. With a little intelligence and knowledge of the people, the inspector would know where to go to look for travellers and get information. House-to-house visitation, unless the staff is enormous, seems little better than waste of time, though I am inclined to think that it is practically never done but is merely made an excuse for failure to get any useful information. More intimate relations between the passport-examining officer and the circle inspector are required, and it is essential that the hospital assistant on passport duty should realize that he is something more than a machine for feeling pulses (*vide* the notes of the Vellore inspection). Prompt and systematized enquiry as regards the whereabouts of defaulters and as to cases of sickness or death, coupled with constant and unremitting check on the part of the superior officers, would unquestionably make the passport-system more respected than it now is: even as matters stand, it works surprisingly well. Various detailed criticisms will be found in Appendix IV, in which my notes of inspection are embodied. I may add that all my remarks have been communicated to the heads of the districts concerned and are engaging their fullest attention. The bulk of the inspections were, in fact, made jointly by the district officers and myself.

28. I have now discussed all the principal points which have come under my notice in connection with the present working of the passport-system and have indicated the chief directions in which improvement seems possible and desirable in the direction of efficiency and popularity. The question of economy still remains for discussion. In this chapter, I propose to do no more than to endeavour to ascertain whether the existence of a special staff of some kind is or is not necessary for the purpose of controlling the working of the system and of achieving the collateral objects enumerated in paragraph 6 above. Three alternatives suggest themselves. The first is that Revenue and Municipal subordinates, in addition to their own duties, should be made available for the duties of checking the work of the passport-system, verifying the registers of the village officers, hunting up defaulters and sick persons, enquiring into recent deaths, examining the death-rate of a village or town and giving the villagers or towns-people instructions in matters relating to sanitation in general and plague in particular. Captain Atal suggests that this might be accomplished, if rewards were held out as an inducement. I apprehend that no system of rewards will enable one man to do the work of two, and it will hardly be denied that the satisfactory performance of the duties indicated above over a series of villages or a large portion of a town is emphatically one man's work. The Sanitary Commissioner has invited my attention (unofficially) to the importance of remembering the unit of *efficient work by one man*. To this principle I would express decided adherence, as will everyone, I apprehend, who considers plague preventive measures to be matters of real practical importance. The Chittoor Tahsildar thinks that he and his subordinates could manage the duties of observation in addition to their own: I suspect that a brisk series of imported cases of plague would lead him to change his opinion. Only four other officers give any support to the suggestion that the same staff could at the same time perform Revenue and Plague duties. I would observe, however, that those who (without wishing to abandon a plague policy) recommend the abolition or the practical abolition of a rural plague staff (and there are many who hold this view) must be prepared to support the proposition stated above or must stand by the proposition that towns-people and villagers will give us all the assistance we want without supervision or control of any sort or must rely entirely on the village headman's ability and willingness to carry out the Plague Regulations promptly, conscientiously and thoroughly.

Necessity for retention of a special staff for such work,

29. So far as towns are concerned, the case for an extra staff seems too strong and clear to require further discussion. The question how it is to be appointed, what it should be paid, how it is to be supervised, when it is to be appointed and removed and how its numbers are to be fixed is reserved for Part IX. Coming to the question of a rural staff, I have to discuss the second and third alternatives suggested, namely that the villagers are capable of protecting themselves or that the village headman

in towns,

in rural areas.

is capable of looking after them without supervision. There is no *a priori* improbability in the villagers attaining to sound notions in regard to preventive measures, as they have been shown to do in some matters connected with the ætiology of the disease (Part V, paragraph 55), but it seems remarkable that those villagers, who have given due consideration to the matter, should have passed over the passport-system as ineffectual and resorted to the undoubtedly more effective system of quarantine. Examples of this drastic method of dealing with travellers are dotted all over the infected areas of this Presidency. Dr. McCaully Hayes gave me (unofficially) a case, in which he himself advised a reddi (who had shown interest in plague matters) to keep outsiders out of his village. The reddi promised to give the matter careful consideration and, shortly afterwards, Dr. Hayes's servant, going to the village for supplies, found his entrance barred. Similar stories come from Coimbatore, Salem, North Arcot, Bellary and Cuddapah. Thorn fences and prickly-pear hedges are put up and guards posted: the quarantine authorities are frequently no respectors of persons, Constables, Plague Inspectors and even Tahsildars having on occasions been refused admittance into the village. In many cases, this system of quarantine seems to have been very successful, one case being quoted in which a village of this description remained uninfected in a sea of plague.

Attitude to be adopted towards the system of village quarantine:

30. Most of the officers consulted think this attitude on the part of the authorities worthy of encouragement: there is high authority for this view: in their orders on the Plague Commissioners' Report, the Government of India observe that "the work of surveillance can best be performed by the villagers themselves, "and they desire that the inhabitants of towns and villages threatened with plague "should be encouraged and assisted to keep an organised surveillance over persons "arriving from infected areas. Very satisfactory information has recently reached "the Government of India that this means of protecting themselves is fully recognised "and freely resorted to in some rural tracts *by excluding persons arriving from infected "areas from coming into a village for the period during which there is danger of their "contracting plague.*" If this be a form of surveillance, it is certainly surveillance from a safe distance. In the face of these expressions of authoritative opinion, it is with considerable hesitancy that I submit one or two difficulties which have been raised by officers in regard to these rural methods of self-protection, but it seems desirable that, if they are to be officially recognised, the legal stand-point should be defined. Mr. Dutt and the Head-quarters Deputy Collector, Mangalore, ask in effect whether villagers, however laudable their intentions may be, have a right to exclude outsiders from their villages, and Mr. Dutt points out (with considerable force) that there is a certain inconsistency in a villager being allowed to go with his passport anywhere he chooses, so far as Government is concerned, but being refused admission to a particular village at the will and pleasure of the villagers themselves. A little more than a year ago, the Collector of one of our infected districts temporarily issued a circular enjoining this practice on the ryots of his district in relation to the inhabitants of a large town, then infected. It was urged, on the strength of the same order which I quoted above (*vide* G.O., No. 878-P., dated 13th August 1900), that the Collector's circular was against the orders of the Government of India, which prohibited quarantine in any shape or form. It might be argued, not without plausibility, that the Collector was endeavouring to follow out the *direct* recommendations of the Government of India, whilst the orders against quarantine were only relevant by *inference*. Be this as it may, the legal question whether the ryot who excludes outsiders from his village is acting in the lawful right of self-defence might become a pressing one, if official recognition and support were given to the movement, and the passportee might certainly put awkward questions as to what was the value of privileges conferred by a passport which villagers were encouraged to ignore. In my respectful opinion, it would be a delicate matter to openly encourage or even to officially recognise the action of villagers, who will probably manage their own affairs best unaided, and such (coupled with a very natural sympathy for villagers who try to help themselves) is the general consensus of opinion that I have received in the matter. In the Plague Inspector's Manual (page 31), Plague Inspectors are directed to point out to the villagers that they will best keep plague from their villages by agreeing "not to "admit . . . . strangers, who have evaded the passport-system from infected

legal aspect of the question:

"areas, until they have of their own free will undergone residence under observa-"tion *outside the village* for ten days." Whose observation? Section 2 of the Mufassal Plague Regulations lays on the headman the duty of himself issuing a passport in such a case and himself examining the man (*vide* also section 88 of the Regulations). The penalty laid down for not taking out a passport is not exclusion from any village but prosecution under section 200 of the Regulations.

31. Apart from the legal question, considerable deductions have to be made in regard to the value of these precautions. In the first place, they are by no means universal: they must rather be considered exceptional, except perhaps in the Salem district. As Colonel Benson, Mr. Brodie, Captain Atal and others have remarked, a great deal depends on whether the village headman or the influential ryots of the village have relations or friends in infected villages: again, as Mr. Brodie and Dr. Gibson observe, the villagers' ideas of infection can by no means be relied upon. Some villagers appear to have realized that cloths and grain are sources of infection: others have not. Mr. Macleod, Mr. Coleridge and Mr. Lancashire find that they only begin to be cautious, when an epidemic is actually at their doors. Sometimes their fear of infection or evacuation will manifest itself in less amiable forms than those described above: they will first admit the traveller: then, when he falls sick, a panic will seize them, and his body will be found outside the village on the road or in a ditch (evidence of Mr. Noyce, Dr. Lubeck and Mr. Vásudéva Rao). It was remarked at the Hosúr Conference that systems of quarantine of this description worked least efficiently, where they would have been of most use: in big market villages, the fear of monitary loss and the prevalence of factions rendered united action impossible. The restrictions on the practice noted in the Vellore Conference are, perhaps, the most significant of all. "This attitude is characteristic "of remote villages rather than villages near big towns. In the latter class of "villages, the towns-people go out to their fields as a matter of course and "would not allow themselves to be restrained from doing so." Without venturing to submit an opinion on the merits of the question, I would merely observe that the action of the rustic community, taken as a whole, is neither sustained, consistent nor wide-spread enough to form any kind of substitute for the passport-system or to dispense with the supervision of the observation staff, whose primary function is of course not to encourage systems of enforced quarantine, which go far beyond the intention of the passport-system, but simply to see that the minimum degree of surveillance prescribed by Government is kept up uniformly throughout the area under supervision. I may add that I doubt whether any support which Government might be pleased to accord to the proceedings of the villagers described above would very greatly extend their scope. The organisation is one which might, in my respectful opinion, be very easily "killed by kindness."

its practical result.

32. The only question which remains for discussion in this chapter is whether the village headman (Munsif, Gownden, Patel or Reddi) can be trusted to work the passport-system or some equally effective system and to give accurate and speedy information in matters of sickness and the like, without the stimulus supplied by the observation staff. The headman is, it may be freely conceded, the basis of our plague policy, just as he is the basis of our fiscal policy and, as I have noted in paragraph 13 above, statistics seem to show that, on the whole, he has worked the passport-system intelligently and satisfactorily. I have not had much occasion to inspect the work of headmen personally, but the Ilitorai village headman (Part V, paragraph 45) had kept his registers satisfactorily, and he was not an exceptionally intelligent or well-educated specimen of his class. Mr. Noyce notes that, as a rule, they maintain their registers well. Surveillance, in fact, was a familiar *idea* to the village headman, hundreds (I might say, thousands) of years ago. For fiscal purposes and in his capacity of arbitrator and general representative of the village, it is and always has been essential that he should know what outsiders come into his village and what villagers leave it. A headman, who professed ignorance on such points to his Revenue superiors, when it was a question of collecting kist or serving a notice or removing an encroachment, would, in the first place, not be believed and, if he were believed, would certainly be adjudged wholly incompetent for his post. The notion that special surveillance is necessary

Criticism of the work of village headmen under the passport rules:

in regard to persons travelling from an infected to an uninfected village has certainly not struck the headman less keenly than it has struck the ordinary villager, whose energetic interpretation of the principle has just been described. He may doubtless be sometimes puzzled, just as Mr. Dance is puzzled (paragraph 25 above), to see a village officially described as infected, when there has not been a case of plague in it for months, but an anomaly, which proceeds by rule, is also, perhaps, not wholly unfamiliar to him. He is, in fact, better fitted than any other person in India for working sections 2 and 82 of the Mufassal Plague Regulations in a thoroughly satisfactory way, and this is one reason the more why neither passport-issuing offices nor frontier stations need be retained in rural tracts : they are, at best, but a perfunctory method of endeavouring to arrive at a result which can be attained automatically through the agency of the village headman.

33. That the system, in the language of one witness, is worked "very loosely" in villages and that the *inspection* of the village headman is frequently a farce is extremely likely, and I think it rather desirable than otherwise that it should be so. As Mr. Brodie observes, the essential thing is that the village headman should realize his responsibility for reporting cases of sickness: the passport-system has the effect of putting his responsibilities before him in a tangible and impressive form and also of giving him the power of compelling the attendance of the passportee, if he wishes to do so: no doubt, it technically *compels* the village headman to enforce the attendance of the passportee: I feel no doubt (from the evidence and from probabilities) that this is by no means universally done, and I see no reason why it should be done. I think that the village headman should definitely have the power of dispensing with the attendance of any passportee, if he thinks fit to do so, on condition that he (the headman) is held fully responsible for immediately reporting any case of sickness or departure on the part of the passportee. If this were embodied in the passport, it would, I think, practically effect the purpose aimed at in Mr. Brodie's suggestion.

whether the stimulus of rewards would be a possible alternative to a supervising staff.

34. The really important question is whether, without the stimulus supplied by a supervising staff, the village officers would do their duty properly in all cases. The Rev. Father Biolly, the Rev. Father Rondy and Mr. Giri Rao think that they would, if they were given rewards for doing so. That the services of a village officer, who has done good work for the authorities in the matter of plague, should be recognized by publication in the District Gazette or by the grant of a certificate (for village officers usually value such tokens of recognition more than money) would, I think, be an admirable thing; but a system by which the village headman was paid so much per case reported would, in my respectful opinion, be wholly opposed to our principles of administration and perfectly useless. Such a system might occasionally make an idle headman a little brisker ; but it is not usually idleness which prevents a village headman from reporting cases ; it is either self-interest or favouritism or fear of his fellow-villagers. Mr. Vásudéva Rao gave me a case in which a village munsif's house appears to have been burnt down, because he reported the occurrence of plague in his village. Apprehensions on the part of village munsif in regard to the effect of his conduct on his relations with his fellow-villagers could not be sufficiently counterbalanced by any reward that the authorities could offer: the system of offering rewards, in so far as it really had any effect, would turn him into a species of hired informer and materially damage his position in the eyes of his fellow-villagers. The subject of rewards will be dealt with in Part X at greater length.

The abolition of a supervising staff considered.

35. The system, as it now stands, is worked by village officers with the supervision (good, bad or indifferent) exercised by the circle staff, and there is no *direct* means of ascertaining how it would work without the staff. Some officers have put forward the individual cases of detection on the part of the circle staff (few or many) as tests of its utility. How far the circle staff have means of detecting cases of plague and what use they make of them will be more conveniently discussed in the next chapter : the system is probably capable of some improvement in that respect, as in many other ways ; but I have already submitted that personal detection is not the test of the work of a supervising staff ; the only means of accomplishing this would be the employment of a series of peons or

constables on the model of the Salt or Police departments. The great question is whether their influence over the village munsifs tends in the direction of better and prompter intimations of plague cases and whether that influence could be dispensed with. This is a matter which has to be decided by opinion. Not a single official, except Mr. Krishnaswámi Aiyar (whose experience lies in Mysore), is prepared to say that the village officers could be trusted to work the passport-system without supervision. Not an official, except the six mentioned in paragraph 28 above, is prepared to say that the Revenue Staff could undertake the work of checking the village officers in addition to their present duties, and the great majority of the officials consulted consider that the special staff, as at present constituted, is (more or less) useful in keeping the village officers up to the mark, though there is a strong consensus of opinion that it is capable of considerable improvement. Mr. Ranganátha Mudaliyár, a non-official and a by no means friendly witness in regard to our measures, thinks that the village officers cannot be trusted and gave me what I have been assured by him and others is a by no means isolated instance of their ruses (paragraph 27 above). Mr. Carr, who has made use of this year's jamabandi to warn the village officers of their duties, indicated the danger of trusting to them at some length, when Collector of Bellary (*vide* the Plague Narrative for March 1902). The three most important districts from a plague point of view are Bellary, Salem and Coimbatore. The official conferences at Bellary and Coimbatore expressed the opinion that the village officers could not be trusted without supervision and the Salem Conference pronounces emphatically that the circle system is the only sound one for purposes of observation. Again, the Salem Conference says, "The scheme, as it at present stands, needs improvement only in the matter of "*personnel*," adding that "this remark applies only to rural areas, emphatically not "to Municipalities, where they are most certainly of use." In this connection, I may quote a remark made by Captain Cornwall, as Deputy Sanitary Commissioner, after a comprehensive inspection of various villages in the Hosur Taluk: "The "passport-system is working well on the whole. This is only to be expected, *if* "*the Circle Inspectors do their duty and check the books and registers, each time they* "*visit a village*" (G.O., No. 1068-P., dated 24th July 1902).

36. Further than this it seems unnecessary to go. The questions at issue in this chapter are, in every sense of the word, administrative questions of the kind alluded to in paragraph 17 of Part I and, where there is a practically unanimous consensus of opinion amongst responsible officials in regard to the necessity for a system, it would require very strong arguments or evidence to justify me in reporting adversely. I am far from saying that the majority of officials represent the system as working satisfactorily or as well as it might work, but the question at issue here is the possibility of dispensing with it as a whole or endeavouring to work the passport-system without its aid: even apart from the opinion of the various officers consulted, analogy would by itself suggest the necessity for some such checking system. In no department of the administration is the village officer left without systematic check: Excise, Land Revenue, Police, Vaccination—all these branches of administration rest on the village munsif as an administrative unit, just as much as plague administration; yet, in all these branches of administration, a checking and a supervising agency (and that, be it remembered, a *special* agency) has been found necessary: the argument advanced against the necessity for a plague supervising staff, namely that they seldom succeed in effecting independent detection, might with almost equal plausibility be advanced against any one of the other departments mentioned above; but this has never been made an argument for abolishing or half-abolishing any one of them, except the plague staff: results are unhesitatingly accepted as the test; if the Salt and Abkári Revenue is collected more fully and promptly with a special staff than without it, it is not considered necessary to decide whether the result is due to direct detection or to supervision; I conclude, arguing from analogy, that the passport-system must be worked by an observation staff or be abandoned altogether, and I do not see how any one, who has any faith in our plague policy as a whole, can fail, on mature consideration, to see that an observation staff of some description is not only desirable but absolutely indispensable. Its desirability, in spite of all difficulties, has been authoritatively Conclusions.

recognized by the Government of India, in paragraph 15 of the resolution on the Plague Commissioner's report published in G.O., No. 878-P., dated 13th August 1900.

Summary.

37. It remains to summarize the conclusions arrived at in this chapter. The postulate that to obtain early information of plague cases is an essential part of our plague policy (Part II, paragraph 3) has been repeated and emphasised (paragraphs 1–5 above), and I have attempted to show (paragraph 6) that the passport-system and the observation system afford the simplest and the most direct way of obtaining that result and possess many collateral advantages also: statistics and the weight of authority have been adduced to show that the passport-system has worked well (paragraphs 7 to 13), and many suggestions made with a view to improving its working from the point of view of efficiency, economy and popularity have been discussed (paragraphs 14 to 27). I have also submitted reasons for the proposition that a special observation staff is required to check the working of the passport-system and have shown that official opinion is practically unanimous on this point (paragraphs 28 to 36). If this view be accepted, it follows that no structural alteration can be effected in the passport or observation systems, without striking at the root of our plague policy as a whole. The necessity for a disinfecting staff has not been called in question by any one. It stands or falls with the decision of the two questions: (1) Is disinfection of use? (2) Can the people be trusted to disinfect their own houses and effects? My reasons for answering the first question in the affirmative and second question in the negative are contained in Part IV, and the exact position occupied by chemical disinfection in relation to other items of our plague policy has been further discussed at the end of the last and the beginning of the present chapter. Such detailed alterations as seem, in my respectful opinion, to be desirable in the actual passport rules I have already dealt with; such alterations as have been suggested in the *personnel* of the observation and the disinfecting staffs and in the general *administration* of the system will be discussed in the next chapter.

PART IX.

The Observation Staff.

Summary, showing the powers, duties and position of the various members of the local plague administration—Suggestions regarding the control over the subordinate plague staff—Desirability of modification in the system of constituting observation and preventive circles—Advantages in the retention of an adequate hot-weather establishment: desirability of greater flexibility in regard to their distribution: importance of hot-weather disinfection—Suggestions as to notification of infected areas—Criticism of the work of the rural and urban plague staff: their lack of local influence and knowledge: their poor prospects—Discussion of the desirability and practicability of the formation of a portion of the staff into a permanent department and of their partial recruitment from the subordinate ranks of the Revenue and Medical departments—Grade of assistant inspectors may be recruited locally—Suggestions as to proper rates of pay and allowances for the subordinate staff and as to the local training of all subordinates whose duties bring them into connection with plague—Necessity for constant European (or Eurasian) supervision.

It is a recognized administrative maxim that a chain is no stronger than its weakest link and, in most branches of Indian administration, the weakest link is found to be the agency by which the various branches of the administration are carried on, the elegance and subtlety of the principles involved frequently contrasting oddly enough with the moral and mental qualities of the staff by which they are translated into practice. Even if it be conceded (and it can hardly be denied) that the calibre of the subordinate plague staff is by no means commensurate with the functions it has to perform, the same criticism is in some degree applicable to almost every other branch of the administration. Inefficiency and occasional venality are no new experience either to the people or to the administration; what is really exceptional is that unfamiliar principles have, in the present instance, been thrust on the mass of the people by an agency which is equally unfamiliar to them: the effect has been to put a severe (perhaps, an unnecessarily severe) strain on the plague policy as a whole. Be this as it may, a special staff of some kind would appear to be necessary: it now remains to be considered how far the existing staff is practically capable of improvement. I shall also endeavour, as directed by Government, to ascertain whether an equal (or greater) degree of efficiency can be obtained with less expenditure of public money. *Necessity for special staff.*

2. It must be conceded that the present plague staff is an extreme example of the application of the principle quoted above. Two-thirds of this staff consist of temporary and assistant sanitary inspectors, that is to say, men picked up anywhere, without any *necessary* qualifications, except a smattering of English, and with such a knowledge of sanitation in general and plague in particular as can be imbibed in the course of ten days' lecturing and two days' mock plague-work. The men thus trained are scattered broad-cast over the Presidency, to superintend disinfection, to enforce obedience to a complicated and vexatious set of regulations and to stir up in the minds of an ignorant and semi-hostile population, to whom they are usually entire strangers, a feeling of sanitary enthusiasm, which can only in very exceptional circumstances be felt by their instructors themselves. That this bold scheme should have met with the measure of success which has undoubtedly attended it seems little short of a miracle. Whilst doing, I trust, full justice to the Sanitary Commissioner's almost necromantic powers, I cannot blind myself to the desirability of endeavouring, if possible, to adjust the means used somewhat more approximately to the end to be achieved. That the staff, as at present constituted, is relatively too weak a link in the chain of our plague organisation there can be very little doubt. *Quality of the present plague staff.*

3. The literature on this subject is abundant and is occasionally marked by a note of bitterness, which is characteristic of subjects which have passed out of the sphere of speculative difference of opinion and entered the sphere of practical controversy, and I doubt whether all the officers, who have been good enough to favour me with their views, fully realized that their writings were destined for the perusal of Government. However, the language of many of the Conferences is equally plain, and I have, on my own responsibility, printed everything that I have *Opinions thereon.*

received with one or two very trifling amendments. The terms of my order of appointment show the exceptional importance which Government attaches to this aspect of the plague policy of the Presidency, and I apprehend that at least as much weight will be attached to the evidence of administrators and enlightened critics on this question as to any conclusions which I may base on that evidence. It will, however, be observed that many of the critics are by no means convinced either of the solidarity or of the success of the plague administration as a whole: if their doubts on that point could have been resolved, they would very likely have seen reason to materially alter or modify their views in regard to this or that feature of the administration.

4. I propose, in the first place, to briefly describe the organization, the discussion of which will form the subject-matter of the remainder of the chapter. The whole scheme of appointments hinges on the legal constitution of certain tracts of country into infected areas and areas under observation. The Local Government or, subject to its control, the Collector of a district has the power of declaring any area to be infected with plague, the power of declaring an area to be under observation being reserved to His Excellency in Council (Plague Regulations, paragraphs 1 and 52). Presumably, the absolute power of withdrawing such notifications at any time that may seem desirable vests in the same authorities, though I find nothing specifically laid down on the subject.

Summary of present rules regarding circles.

5. These notifications impose certain liabilities on the Collector, it being laid down that, when an area is declared to be under observation, he *shall* divide the area in question into circles, having ordinarily a diameter not exceeding ten miles, and *shall* appoint an inspector for each circle. If the area be a municipal town, he is bound to appoint a number of assistant inspectors, to be fixed with reference to the houses and population of the town, and is also bound to appoint divisional inspectors to supervise groups, ordinarily consisting of three such circles. The appointment of supervisors in rural areas is discretionary. Nothing is said regarding non-municipal towns (section 56 of the Regulations).

6. When an area is notified as being infected, it is incumbent on the Collector to *halve* the diameter of these circles all round the infected area, up to a distance *not exceeding* 20 miles from the infected area: this would have the effect of more or less quadrupling the number of inspectors, if strictly followed out. No separate rules are laid down as to urban circles in or near an infected area. Nothing is laid down as to the withdrawal of the staff or the removal of the circles. The smaller circles are known as preventive circles and the larger circles as observation circles (section 73).

Controlling officers under present rules.

7. The control of the plague measures is vested in the Collector, under whom the plague authorities are classified as plague officers (including District Medical and Sanitary Officers, Divisional Officers, Assistant Collectors and Special Plague Officers appointed by Government) and assistant plague officers (including Municipal Chairmen, Tahsildars and Deputy Tahsildars). Municipal Chairmen can be separately appointed by Government to be Special Plague Officers. The powers to be exercised by these officers are such as the Collector thinks fit to confer and extend over such local jurisdictions as the Collector may determine. It will be noticed that Municipal Chairmen have no jurisdiction whatever in plague matters, beyond what the Collector may think fit to confer on them. Municipal *Councils* are wholly without actual or possible jurisdiction in plague matters (sections 103 and 104 of the Regulations). In practice, when a Municipality is infected with plague, a special officer is usually appointed to take the complete control of the plague operations, whilst, in Municipalities under observation, the control is usually vested in the District Medical Officer or the Divisional Officer. It is quite impossible for the Chairman to supervise the plague administration and at the same time to attend to the ordinary sanitary and other requirements of the town, which at such a time require more attention than usual. The arrangement doubtless puts the council in the somewhat unpleasant position of having to pay for a variety of measures over which they have no control (*vide* Mr. Rangonátha Mudaliyár's evidence), but this is, in the circumstances, unavoidable. Whether the passport-work in municipal areas under observation is supervised by the District Medical Officer or by the

Divisional Officer or by the Municipal Chairman or by a special officer is a matter of convenience, but it seems desirable that there should be no ambiguity or doubt as to who has the actual control (*vide* my Salem Inspection Notes). It is no part of my duties to report on the adjustment of charges under the heads, Provincial, Local and Municipal. Only in regard to one matter (Part VII, paragraph 14) have I ventured to suggest the expediency of a provincial contribution to what would ordinarily be municipal or local expenditure. There is no need for me to enlarge on the bankrupt condition of Municipal and Local funds and the consequent stagnation of many branches of local administration, the fact being emphasised in the order under which I am working.

8. Under the officers mentioned above, come the supervisors appointed for rural areas, who "are usually of the European or Eurasian class and are selected "with reference to former training in other departments, fitting them to maintain "discipline" (P.I.M., 24): then come the certificated, temporary and assistant sanitary inspectors. Of these, the certificated sanitary inspectors have undergone a six months' training in general hygiene, whilst the other two classes of inspectors have undergone the training indicated in paragraph 2 above. Candidates who have qualified in the examination held at the conclusion of the twelve days' course are designated temporary sanitary inspectors; those who have taken low places in the list are designated assistant sanitary inspectors, as also those who for reasons of temporary convenience are so classified by the Sanitary Commissioner. *Certificated* sanitary inspectors should be usually employed for disinfecting work; assistant sanitary inspectors are usually employed in towns. The pay of these various classes of inspectors varies according to circumstances. The Collector is not at liberty to put any other person on plague duty, when any person of one of the three classes mentioned above is available. They are entitled to a month's notice before discharge (sections 56 and 113 and Appendix II-S of the Regulations). I am unable to agree with Mr. Rice in thinking this concession unduly favourable, though I admit that it is frequently a cause of additional expense without adequate return. It must be regarded as a penalty paid for the temporary system of employment. These officers are also of course liable to be dismissed (or awarded any lesser punishment) by the local authority under whom they serve. When a punishment of dismissal or suspension is awarded by the Collector, the Sanitary Commissioner, if he agrees with the decision of the Collector, strikes the offender's name off his books. If he does not agree with the Collector's decision, the man's name is retained on the books of the Sanitary Commissioner, and that officer, if he so elects, sends him out once more for plague employment. Under section 56 of the Regulations, a Collector is apparently bound to accept a subordinate of this kind, whom another Collector has dismissed or even (for ought that I can see to the contrary) a subordinate whom he has dismissed himself; at any rate, he would be bound to accept such a subordinate, if there were no other trained men available. Government has never, so far as I am aware, expressed approval of or given sanction to this arrangement. Collectors appear to have entered into an informal arrangement amongst themselves, by which lists of dismissed sanitary inspectors are circulated and under which each Collector agrees not to take a man who has been dismissed in any other district (Bellary and Kurnool Conferences).

Subordinate officers.

Suggested amendments in the procedure as regards the punishment of temporary and assistant sanitary inspectors.

9. Whatever conclusions may be arrived at on other matters, it seems certain that the arrangement described in the last paragraph is likely to lead to ill-feeling and strained relations between the authorities concerned. I have some files of correspondence at my disposal to show that this has been the actual result, but their publication would serve no useful purpose, the question at issue being in no way whether the judgement of one authority was better than that of another authority in any given case. A dismissal should, in my respectful opinion, always involve complete and final loss of employment in Government service, and such is the general rule. The possibility of hasty and ill-considered action on the part of a local authority is met, in all other departments, by giving the subordinate punished a definite right of appeal. In G.O., No. 757 P., dated 19th May 1904, Government has given Collectors disciplinary powers in regard to hospital assistants on plague duty, subject to an appeal to Government through the Surgeon-General. I submit that some rule of this kind would seem equally appropriate to the case of sanitary

inspectors on plague duty. Putting aside the case of sanitary inspectors on *deputation*, I would suggest that, in regard to temporary or assistant sanitary inspectors, an order of dismissal or suspension by the Collector should be an absolute bar to the re-employment of the inspector concerned in any post under Government or under any local or municipal body and that the name of such a man should be struck off the list of sanitary inspectors eligible for employment, either permanently or during the period of suspension, as the case may be, subject to an appeal to Government through the Sanitary Commissioner or to a reference to Government by the same authority, in cases of dismissal or of suspension for over nine months. In Bellary, Kurnool and Hosúr, cases were given me of sanitary inspectors having been dismissed and then having reappeared in the same or a different district, and I have authoritative information of similar cases in the districts of the Nilgiris and Coimbatore. Such incidents seem to account, in part, for that somewhat insubordinate spirit, which, as I shall show below, is one of the characteristics of the subordinate plague staff (*vide* paragraph 18). The Collector of an infected district or of a district under observation is directly responsible to Government for his administration, and I submit that his orders on points of discipline in plague matters should be final and conclusive, subject only to such control as Government may deem it expedient to reserve in its own hands. It would theoretically be right that the Sanitary Commissioner should have the power also of referring to Government cases in which sanitary inspectors, whom he considered deserving of punishment, were not punished or were insufficiently punished, but I do not find that such a case has ever arisen in practice. The case of sanitary inspectors resigning appointments on frivolous and insufficient grounds has been dealt with in G.O., No. 375 P., dated 23rd February 1904. Here, I would simply submit that a resignation is very frequently adopted as a means of avoiding impending dismissal or is an accompaniment to conduct which would have otherwise entailed dismissal. In either case, the principle suggested above would seem to make it desirable that Government should be the final Court of appeal, the Collector being allowed *absolute* power to bar all right of re-employment for a period of nine months. Doubtless, there is another way of looking at the matter, namely that these inspectors are mere private employés and that their employment is simply a matter of private contract between the Collecter and themselves; Government might, perhaps, not deem it expedient to take cognizance of such contracts, but, in that case, I submit for consideration the question whether inspectors should be *forced* on Collectors in the manner laid down in section 56 of the Regulations.

Procedure adopted in regard to the closure of plague circles.

10. Hospital assistants on plague duty stand in a somewhat exceptional position, but this will be better dealt with later on in the chapter. I proceed with the enunciation of the rules defining the existing organization. I have already noted that the regulations say nothing in regard to the closing of circles, but, on page 26 of the Plague Inspector's Manual, it is laid down that "the complete "staff must be maintained in the preventive circle for ten days after the last "attack of plague in it" (*commencement* of the last attack ?) "and the observation "staff for at least twenty days after the last attack in the town and until *in the "judgement of the Collector of the district* the town be no longer imminently "threatened with plague." I find nothing separately laid down in regard to the closure of circles in *rural* areas, but presume that the very salutary principles and limitations laid down above are intended to apply to rural and urban areas alike. In practice, however, it would appear that the formation of observation and preventive circles has always been subject to the orders of Government, and the power of *closing* circles at discretion has been definitely withdrawn from Collectors in G.O., No. 478 P., dated 14th April 1903. The recommendations of the Sanitary Commissioner contained in that order deserve quotation: "I consider it quite as "important that Collectors should obtain the sanction of Government for closing "circles as it is for opening them, the practice, however, being for Collectors to "close them in anticipation of sanction. I advise that, each time it be desired "that observation or preventive circles in rural or municipal areas be closed, it be "required by Government that a statement be appended to the application, showing "the number of plague attacks and deaths, according to dates, for six weeks "previously, under the heads of Indigenous and Imported." As matters stand,

statements of this description are submitted to Government through the Sanitary Commissioner, who, after such enquiry as he deems necessary, submits his recommendations to Government, orders being passed with reference to these two reports. The Sanitary Commissioner's report is communicated to the Collector with the final orders of Government on the subject.

11. Plague administration has been divided, in my order of appointment, into two heads, Remedial and Preventive. So far as remedial measures are concerned, I have already, in Parts III to VII, submitted such suggestions as seemed to me to make for increased economy, efficiency or popularity. With regard to the portion of the staff which is engaged in disinfection, I have no general suggestions to make in the direction of economy, except in regard to the question of pay, which will be more conveniently dealt with later on in this chapter. It has no doubt been contended that disinfection is useless, especially in rural areas; this point has been fully discussed in part IV; *granting it to be of use*, no one has contended that undue attention is being paid to it, nor has it been contended (except for a few detailed suggestions, the most important of which have already been discussed) that it could be more cheaply carried out. The general impression is that, to make it effective, further expenditure is required. Broadly speaking, therefore, if economy is to be effected in plague administration, it must be by curtailing the numbers of the plague staff, by curtailing the duration of the period of complete or partial observation or by reducing the pay of the staff. The question of pay will be best discussed in connection with the question of efficiency and so also the nature and extent of supervision required: there remains the question of the size of the circles (which is practically synonymous with the question of the number of inspectors to be employed) and the question of hot-weather establishments (which, when settled, decides the question of the duration of the period of observation).

Possible modes in which economy can be effected.

Size of plague circles.

12. The rules in regard to the size of the circles are noted in paragraph 4 above. Of the *rationale* of these rules I have not been able to find any explanation, except that contained in a letter from the Sanitary Commissioner to the Collector of Coimbatore, which runs thus: "Ordinarily, an observation circle of 10 miles "diameter or, as it really usually is, an observation square of 10 miles is as much "as a conscientious plague inspector can get through, so as to inspect each village "and hamlet and all infected areas not less than once in seven days, which is the "minimum requirement. A preventive circle, being half the size of an observa-"tion circle, ought to be capable of being inspected twice in a week." In a letter printed in G.O., No. 566 P., dated 11th May 1903, there is a further allusion to this subject, in which it is remarked that a week is really rather a long period to take, as "the majority of cases of plague occur within five days of incubation." I thus find no other justification of the existing rule than the opinion of the Sanitary Commissioner that circles *or squares* of 10 miles can usually be effectively patrolled in a week. I would first observe that, if a square could be patrolled in seven days, a circle, with its diameter equal to the side of the square, could be patrolled in $5\frac{1}{2}$ days. Secondly, it has to be noted that circles (and circles and diameters are the precise expressions used in the regulations) must, on simple geometrical principles, be a merely general way of describing the division to be effected: it is impossible to divide an area into circles of equal diameters, without leaving *considerable* gaps; thirdly (and this is the point on which I would lay most stress), the time within which the villages of a given circle can be efficiently patrolled depends on a variety of extraneous circumstances, the number and condition of the roads, the kind of country, the nature of the cultivation, the number of villages, the density of the population, the degree of apprehension of plague, the class and temper of the inhabitants of the area, etc. In my opinion, the remarks of the Sanitary Commissioner quoted above furnish the ground work for an apparently better rule than the one now in force. I submit that, if Collectors were instructed to make their circles such that an officer could patrol them in a week with due regard to efficiency and if the 10-mile diameter were merely retained as a *suggestion* and a *maximum* (that is to say, that an officer should be required to give special reasons for making the area of a circle *less* than 100 square miles), all cause for misunderstanding would be removed and increased efficiency and economy might be expected to result. There seems, in my respectful opinion, something paradoxical in a rule,

under which a clerk in an office with a compass could theoretically plan out the distribution of the plague staff of the Presidency, dealing with Nellore, South Canara and Tanjore on the same principles, and wholly irrespective of the question whether a circle passed through a desert or included three minor unions. Doubtless, such solecisms may never have occurred in practice, the rule having, as my enquiries show, been pretty generally interpreted in a very free sense; but I submit that, where it is necessary to frame rules at all, it seems best that they should be so framed that they can and ought to be strictly obeyed. Further, this particular rule has given rise to a great deal of correspondence and has helped (in conjunction with other matters) to reduce acute non-official critics (and, I suspect, some officials) to a condition of regrettable scepticism in regard to the *rationale* of the plague administration as a whole. The administrators of our plague-infected districts are placed in the most favourable position for giving Government the best that is in them, when the rules framed for their guidance are based on *general principles*, of which they can appreciate the force, whilst leaving them (within the limits of those principles) free play for their individual judgement.

Opinions on the circle system.

13. Doubtless, the circle system, according to its simplest definition (*vide* paragraph 6 of Part VIII), is an admirable system, as observed in the Salem Conference, but not one of my 135 witnesses has a word to say in favour of the system of 5 and 10 mile circles. It was specifically condemned, by officials and non-officials alike, in the Bellary, Salem, Vellore and Coimbatore Conferences. The Hon'ble Mr. Andrew, Mr. Macleod, Mr. Carr, Mr. Brodie, Mr. Robertson, Mr. Dutt, Major Ffrench, Mr. Coleridge, Mr. Couchman and Mr. Graham all testify against it. Mr. Brodie's remarks have, in a large degree, formed the basis for my own: Mr. Carr and Mr. Dutt give one instance, which shows how little reliance can be placed on the rule as a practical guide, by observing that, in zamindari tracts, twice as much supervision is required as in ryotwari tracts, owing to the comparative ignorance and independence of the village officers in the former tracts. The Rev. Mr. Chamberlain (whose experience lies mainly in towns) observes that he is not disposed to question the present distribution of the staff according to *population* and extent of territory, not realizing that population has nothing to do with the rules in regard to rural tracts. Major Ffrench strikes what seems to me to be the right note, namely that the principle of constituting circles should be the time within which the circle inspectors should go round them.

Conclusion.

I would therefore respectfully suggest that it be definitely laid down that the Collector of each district affected should satisfy himself, either by his own rough observations or by those of a Divisional Officer or Special Plague Officer or Assistant Collector, that the circles which he constitutes or has constituted are such as an inspector can patrol in a week with due regard to efficiency. I would also suggest that such circles, once formed, should not be changed, except on the motion of the Collector or after due consideration of anything that the Collector may have to urge in their favour with reference to anything that may have been urged against them. Similarly, the principle of the preventive circle should be (in accordance with the Sanitary Commissioner's letter quoted above) that the circle inspector should be able to patrol it with due regard to efficiency *twice* a week. I may observe that, *cæteris paribus*, a circle (or square), of which the diameter (or side) is *halved*, should be capable of being patrolled *four* times as often as the original circle; but, doubtless, the work of a preventive circle inspector should be more thorough and minute than that of an observation circle inspector. In any case, the amended rule, which I have suggested, makes the decision of this and all the other connected questions rest, in the first instance, on the judgement of the administrative head of the district, a principle which seems to require no special justification here. To what extent economy may be expected to result from the application of the principle suggested, I am not in a position to say, though, in Bellary, it is distinctly held that efficiency *and economy* would be the result of such a change; if my views meet with acceptance, the point can, perhaps, best be determined, by Collectors being enjoined to report how far the practical application of the principle would lead to difference in practice. In some districts (South Canara for example), I gather that it will probably be found desirable to materially contract the area of observation, the separation of the houses and the absence of villages on the West Coast rendering

it advisable to make the circles much smaller and at the same time rendering it unnecessary to extend the tract under observation to so great a distance from the infected centre. The Head-quarters Deputy Collector, Mangalore, makes some instructive (though somewhat sweeping) remarks on this aspect of the question, and all the witnesses from that district are impressed with the extreme difficulty of working the circle system properly, as now organised (*vide* Part VIII, paragraph 11). I regret that I was unable to visit that district personally; discussions might have produced something more fruitful than a mere *non possumus*. I have already noted (paragraph 6 above) that the area of observation is entirely discretionary, as the rules now stand, and that the area which should be covered by preventive circles is only given as a *maximum*. Within this maximum, therefore, full discretion can even now be given to the Collector. I agree with some officers, who suggest that, as far as possible, circles should coincide with the areas (taluks and firkas), now existing in relation to revenue work. The reason for this will become clearer in the sequel. Such remarks as have to be made about the constitution of urban circles will fall into their place, when the qualifications of assistant inspectors are discussed.

14. I am aware that the Sanitary Commissioner attaches great value to the *present* method of distributing circles, but I find that the alternative principle which I have suggested is also based on an expression of his views. The time suggested by the Sanitary Commissioner as that within which a circle inspector should be able to get round his range, namely a week, seems to meet the case excellently: unfortunately, I was unaware, until a late stage of my tour, that the existing rule was supposed to be based on any such principle: had I known this earlier, I would have embodied a specific question on the point in my list of questions. Question (B) (1) (*b*) was couched in too vague a form to elicit a direct answer on the point from officers who were presumably as ignorant of the principles underlying the rule as I was myself. Should Government be disposed to regard the *period* within which an inspector should patrol his circle as an open question, the opinion of Collectors might be invited on the point, but I hardly think that there will be much difference of opinion as to the period which should be decided on. I am aware that some few officers are in favour of a somewhat indefinite enlargement of circles, based apparently on the general ground that, where efficiency is unattainable, economy should be studied. This leads logically to the conclusion that no circles at all need be constituted, but with this view I have already expressed my disagreement (paragraph 37 of Part VIII). It is, on the contrary, as it seems to me, desirable to aim at the principle of protecting small areas thoroughly rather than large areas imperfectly, but I do not think that it would be possible to lay down any general rules on such a point. The local knowledge of the Collector, coupled with considerations of efficiency and economy, can most appropriately be the guide in each case as it arises.

Retention of establishments in the hot weather.

15. The next point for consideration is the extent to which a hot-weather establishment should be retained. The system now in vogue has been described in paragraph 10 above. There is considerable diversity of opinion on this question. Mr. Macleod, Colonel Pemberton, the Rev. Mr. Chamberlain, Mr. Bardswell and (to some extent) Mr. Carr consider the retention of a special establishment during the period of quiescence wholly unnecessary. Colonel Pemberton's views, which are given at some length, are chiefly based on an assumption that the village reddi can be trusted to do everything that is necessary in the way of reporting. This has been discussed already (Part VIII, paragraphs 35 and 36). Colonel Pemberton, however, would supplement the ordinary revenue staff to the extent of keeping hospital assistants in reserve. The desirability and possibility of employing hospital assistants on plague duty is discussed in paragraphs 44 and 45 below. One of my questions dealt with the possible use of the hot-weather staff and with their possible advantages in forming a "trained nucleus" when plague broke out. Colonel Pemberton meets this by the remark that the men are "supposed to be "trained" before they come to the district. My question was, perhaps, unfortunately worded. It was not intended to refer to the 12 days' training in Madras (to which training neither Colonel Pemberton nor I attach pre-eminent importance)

but to training in local conditions and circumstances. The Rev. Mr. Chamberlain would trust to the ordinary municipal staff in the hot weather. Here, again, I must solicit a reference to Part VIII of the report (paragraph 28). In truth, if it be conceded (1) that "dropping cases" of plague are a *possibility*, (2) that fresh imported cases of plague are *almost certain*, (3) that, at the season of inevitable recrudescence, it is better to have men who know the district and have been drilled to their work than complete outsiders, it must be admitted that a complete disbanding of the staff or even a disbanding of the greater number of inspectors will be a sacrifice of efficiency to very doubtful economy. It is almost as true of an infected as of an uninfected district that the point of pre-eminent importance is the manner in which the first plague cases of the season are dealt with. Proper measures in June and July will save thousands of lives, where the same expenditure and the same measures in October or January will only save tens or hundreds of lives. This conclusion seems to follow with certainty from the principles laid down at the commencement of Part VIII (*vide* also Appendix I (1) to the Plague Regulations). When once the disease has slipped past the staff and a series of epizoötics have started amongst rats, the work of prevention becomes infinitely more expensive and less satisfactory. To these arguments I would add the very strong advantage, from every point of view, of giving as large a proportion of the staff as possible a feeling of permanence; this point is dealt with at greater length in paragraph 33 below.

Opinions of officers thereon.

16. My general views as to the necessity for a hot-weather establishment have commended themselves to a variety of officers, amongst whom I may mention the members of the Coimbatore and Hosúr Conferences, Major Wright, Major Leet Palk, Mr. Noyce, Mr. Wait, Mr. MacIver, Mr. Krishnamáchári and Mr. Lobo. Here, again, however, there is considerable divergence of opinion in regard to the duties on which the staff should be engaged during the hot weather and the object with which their retention is desirable. It may be observed that there are three sources of possible danger to be guarded against at the expiry of the season of quiescence, (1) human importation, (2) rat-infection, (3) recrudescence. It will be further observed that, whatever view be taken in regard to the relative importance of these three possible sources of re-infection, the quiescent season is the best season for taking effective measures against any one of them. He who attributes especial importance to *recrudescence* will wish that all infected villages should be thoroughly disinfected at a time when there are no disturbing influences in the shape of infected rats or human beings: Mr. Noyce remarks that "disinfection is "more useful" in the hot weather "than at any other time, when properly super- "vised. It is more possible for houses and persons to be thoroughly disinfected "and for the superiors to superintend the work in person. Men kept on are more "useful when the work begins in real earnest." Mr. Krishnamáchári would have the disinfecting staff *increased* during the hot months. Mr. Lobo goes even further and suggests that, during the hot-weather months, "a general order be given to the "public to have all their houses desiccated in the infected area, by exposing them "to sunlight for at least one full day." As regards the destruction of *rats*, I have already given my reasons at length (Part VII, paragraphs 23 to 28 and 37) for considering that the quiescent season is the time at which a campaign against rats should be undertaken, if it is to effect the maximum of good with the minimum of risk. The importance of a hot-weather staff as a means of preventing *human* importation of plague is very generally recognised, and Mr. Brodie speaks of it as *indispensable* for this purpose. Mr. Lobo, who has dealt with the question of hot-weather establishments with admirable fulness and judgement, observes that "it is "generally during the hot weather that the greatest vigilance on the part of the "staff is called for." He then enumerates the various tasks which he would impose on the circle staff at such a time. The Sanitary Commissioner's references to the importance of this aspect of the case are numerous and weighty. One of the most recent is printed in G.O., No. 674 P., dated 2nd May 1904. Lastly, the advantage of a hot-weather staff as a *nucleus* is also generally recognised. Mr. Lancashire remarks that it is "indispensable that the men should know the geography "of the country. They can't do this if they are got together in a hurry." The Adóni Secretary is convinced of the importance of this point "provided it is guaranteed

"that the hot-weather staff will not be permitted to resign until the next hot "weather." Mr. Noyce's remarks on this point are quoted above.

Effect on the staff of lack of work in the hot weather.

17. I do not think that these arguments in favour of the maintenance of a considerable portion (perhaps the whole) of the hot-weather establishment would, in themselves, be seriously gainsaid by the majority even of those officers who have condemned the present system as involving useless expenditure. What is most earnestly deprecated (and not without some reason) is the present somewhat unintelligent use of the staff, who are kept incessantly performing their beat duty, like policemen in a country where there is no crime, and whom their own superiors are not empowered to put to any directly useful work. This system seems, in my respectful opinion, to be bad for the staff, prejudicial to discipline and liable to bring the whole system into undeserved disrepute. Nothing has contributed to a greater extent to strengthen the popular idea of the circle inspector as a man who draws large pay for doing nothing at all. Mr. Ranganátha Mudaliyár's oral remarks on this point were extremely detailed and forcible. I have, however, merely transcribed the summary in my notes: "The extravagant lives led by the observation "staff show how much they are overpaid and how little they have to do . . . . "The circle staff are mere postal media . . . . The people regard the circle "staff with abhorrence . . . . Hot-weather staffs are maintained on an un-"necessarily costly scale." What I would especially lay stress on is the fact that the staff, under the present system, tend to contract lazy and dissipated habits and that they thereby alienate popular and official sympathies alike. This probably accounts, in part, for their frequent resignations before plague breaks out, a fact on which the Sanitary Commissioner comments and on which he bases the *rationale* of a plague allowance (*vide* his letter included in G.O., No. 815 P., dated 3rd June 1904). The Adóni Municipal Secretary gives an instance in which the whole of the staff resigned in a body on the appearance of plague, after drawing their full salary throughout the hot weather. Hence his proviso noted at the end of the last paragraph. Again, Collectors will naturally be desirous of securing the maximum of combined efficiency and economy during the hot-weather months, by dispensing at the earliest possible date with the superfluous members of the staff and disposing of the remainder in such a way as to get the most useful work out of them, but the necessity for obtaining preliminary sanction, the necessity for preparing statistics and replying to intermediate references before anything can be done and the prohibition against letting a temporary inspector do disinfecting work make the position of the local officers one of great difficulty and delicacy and seem to stand somewhat in the way of efficiency and economy. The month's notice required under the existing rules (paragraph 8 above) is another obstacle in the way of economy, but this seems unavoidable.

Local authorities should be given greater control over the staff.

Want of discipline in the subordinate staff.

18. The opinion that local authorities should, in the interests alike of efficiency and economy, be given greater discretion in the management of the staff, especially during the hot-weather months, is practically unanimous. I may instance the Conferences held at Bellary, Salem, Coimbatore and Adóni, four of the most important centres of yearly re-infection, and would also invite attention to the evidence of the Hon'ble Mr. Andrew, Mr. Carr, Mr. Reilly and Mr. Noyce. A case quoted by Colonel Pemberton shows the extremes to which a really stupid and apathetic inspector will carry the principle of separation of duties. "Recently, "plague occurred in a village 14 miles from Bellary, several cases of plague deaths "occurring every day; the inspector visited the village and disinfected a few "houses. Instead of remaining in the village, the only one infected in the taluk, "he left for the next village and made no report either to me or to the taluk "authorities. The first intimation was received from the reddi of the village; "here, if he had acted with promptness, he could have suppressed the disease. "What has now occurred? Several of the villagers have gone to non-infected "villages and Bellary, and I anticipate fresh outbreaks in some of these villages." Had Colonel Pemberton also anticipated an outbreak in Bellary town, his anticipation would (unhappily) have been realized. I do not say that the rules, even as they stand, offered a justification for the disastrous folly and apathy of this inspector, but I do respectfully maintain that men of this description cannot safely be entrusted with the privilege of working under a set of rules which they know to

be independent of the wishes of their immediate superiors. Many officers have dwelt on an absence of a sense of responsibility and subordination as being a mark of the temporary staff. The Hon'ble Mr. Andrew, for example, observes that "they seemed to think that they formed a separate department and should not be "found fault with or dictated to by the local authorities" and gives an instance in which he considered the attitude of one of them "subversive of discipline."

19. The Sanitary Commissioner has repeatedly emphasised the importance of assigning definite duties to each and every member of the plague staff and not countenancing the notion that any inspector can undertake disinfecting duties and the duties of observation at the same time. He remarks in one place "Efforts at "economy were made, by requiring the so-called observation inspectors to under- "take systematic disinfection within their circles. Such an arrangement is "gradually fatal to all organisation . . . . Distinct staffs are essential," and again, "At no time should an observation circle inspector be allowed to desist "from the important duty of rapid observation and subsequent segregation of fresh "cases. . . . . If a thing is worth doing at all, it is worth doing well", and again, "If the observation staff be 'pinned' to a village to undertake disinfection, "the observation work must break down" (G.Os., Nos. 198–199 P., dated 27th January 1904, and 769 P., dated 31st May 1904; also letter No. 2607-S., dated 11th July 1904, from the Sanitary Commissioner to the Collector of Coimbatore). These views have my thorough adherence. If an inspector is called upon to fulfil two independent functions at the same time, he will neglect both and be able as a rule to escape censure for failure in either; but let me take a concrete case: suppose that plague has died out in a particular area. The definite limit laid down in the Plague Inspector's Manual as that within which circles should not be interfered with (*vide* paragraph 10 above) has passed: the Collector has 20 circle inspectors patrolling their circles aimlessly: he recommends that the circles should be reduced (say) to six and that, of the remaining fourteen inspectors, six should be dispensed with and eight used for disinfection. A month passes, before he gets orders; meanwhile, he is advised to increase his disinfecting staff independently (G.O., No. 796 P., dated 31st May 1904). Meanwhile, if he gives any of the inspectors notice, he does so at his own risk. He may eventually be directed to retain them, and they may meanwhile have made their own arrangements. This seems, in my respectful opinion, to work against economy and efficiency alike. My own recommendations are as follows: after the limit laid down in the Plague Inspector's Manual has passed, the Collector should have the power, in anticipation of approval, to halve the number of inspectors in the area free from infection: the half that are set free from observation duty can, at the Collector's discretion, be either employed on disinfection duty or their services dispensed with or partly one and partly the other: in submitting his scheme for approval, the Collector should furnish the information suggested by the Sanitary Commissioner in paragraph 10 above and should also report what is his scheme for carrying out the systematic disinfection of the more important villages which have recently suffered from plague in the tract in question, what agency he is retaining or freshly making use of for the purpose of systematically disinfecting these villages and within what time he hopes to complete the work of hot-weather disinfection. A scheme for trapping and poisoning rats (with the co-operation of the villagers) may, with advantage, be made an essential part of this scheme of hot-weather disinfection (Part VII, paragraphs 26–28). No alterations should, in my respectful opinion, be made in the Collector's hot-weather scheme (when kept within the limits quoted above), until he has had an opportunity of knowing what has been urged against them and until his final report has been considered. Subject to this last proviso, I would recommend the continuation of the existing practice in regard to any scheme for the reduction of the disinfecting staff or for the reduction by more than one-half of the observation staff. It may be noted that the latitude allowed the local authorities by my suggestion is very much less complete than that allowed the Collector by the Plague Inspector's Manual (*vide* paragraph 10 above).

Larger powers to be conferred on Collectors.

Suggested plan of campaign for the hot weather.

20. The normal range of the circle inspector would thus be doubled in the hot weather or, in other words, he would have a circle which he could move completely round once in a fortnight. The completion of the hot-weather scheme

of disinfection should be so arranged as to finish within three weeks of the period at which previous experience suggests that recrudescence is to be expected, in order to allow of the observation staff being restored to its full strength three weeks before the probable date of the outbreak. The circle inspector, during his hot-weather rounds, would be occupied in getting useful information and also in the various collateral duties imposed on him by the Plague Inspector's Manual (pages 31–34). I would also invite attention to Mr. Lobo's remarks in this connection. The adoption of the suggestion of the Sanitary Commissioner as to giving a small advance to circle inspectors for general sanitary purposes in connection with their hot-weather tours would probably be found very helpful (*vide* G.O., No. 549 P., Mis., dated 18th May 1903). Colonel King, on one occasion, suggested ten days as the period within which circle inspectors should patrol their ranges in the hot weather (G.O., No. 566 P., dated 11th May 1903). With all deference, I think that a fortnight's range might safely be given them, until the season of recrudescence approached, and there would be obvious advantages in a change which could be given effect to by simply knocking two circles into one and did not involve the labour of turning three circles into two.

21. One difficulty stands in the way of carrying out the suggestions made in paragraph 19, namely the rule that temporary inspectors should not be deputed to disinfecting work, and I must therefore at once submit my reasons for thinking that this rule should be abolished, though the argument would come more naturally in another connection. I have not found any definite reason assigned for this rule, but presume that it rests on the assumption that disinfecting work involves more skill and sense of responsibility than the duties of observation and should therefore be left in more skilful and conscientious hands. So far as my enquiries go, they show that disinfecting work is tedious, monotonous, distasteful and badly paid, by comparison with circle work, but I can find nothing to show that it requires a relatively high type of ability. Such duties very soon resolve themselves into a dull routine, tempered by opportunities for favouritism and extortion. The duties of a circle inspector appear to me to require infinitely more tact, character, spontaneity and resourcefulness: moreover, the circle inspector has to frequently exercise powers of diagnosis and it is desirable that he should have some notion of the treatment of plague cases. These acquirements, unlike chemical disinfection, cannot be learnt by rote. How great are the demands on the judgement of the circle inspector will be apparent from the instructions contained in pages 39–48 of the Plague Inspector's Manual and from many other parts of the same book. If I may be pardoned for adducing a personal argument, I would myself confidently undertake the duties of a disinfecting inspector after two days' practical training, but, before undertaking the work of a circle inspector, I would like to have at least a year's training in sanitation and diagnosis and should even then need the recollection of 15 years' official experience of the country to nerve me to the task. How any person, who can be trusted to perform the complex and difficult duties of a circle inspector, can be considered unfit for the task of preparing a simple chemical solution and dashing it on the walls of a house is to me a great mystery. On this ground alone, I think that, at the commencement of the hot-weather operations, Collectors might safely be given absolutely unfettered discretion in the matter of transferring any inspector they pleased (certificated or temporary) from observation to disinfection work. The only point to be insisted on is that the two functions should never inhere at the same time in the same person.

Objections to the rule against temporary inspectors doing disinfecting work.

22. But this is by no means all. I should myself be disposed to say that the converse rule to the present was far more desirable. At present, the certificated sanitary inspectors are being largely employed in the nauseous routine of disinfection work. This seems, in the first place, a waste of our best material; in the second place, it is this separation, which has probably led, in part, to disinfecting inspectors being to some extent left to themselves (especially in rural tracts), with the result that their characters seem to have greatly deteriorated. There *are* undoubtedly temptations thrown in the way of the disinfecting inspector: it is not very difficult for him to extort money by threatening to do too much, and it is the easiest thing in the world for him to get money by the simple process of doing nothing. Neither certificated nor temporary sanitary inspectors are proof against

Certificated inspectors should be put on circle work.

these temptations, and there is no moral doubt that the amount of venality in connection with disinfection is of a shocking description. Even from this point of view, the advantages of employing the services of the *least* qualified men for disinfecting work seems apparent. The best men will thus be kept out of temptation and given work which requires some mental calibre, whilst the paramount necessity for constant and untiring supervision of disinfecting work (whether in the interests of morality or efficiency) will be more prominently forced on the attention of the local authorities. Mr. Coleridge's evidence contains some useful notes on the qualifications required for the observation and disinfecting staff respectively.

Universal condemnation of disinfection work.

23. None the less, *constant* supervision is hardly possible, and it may be thought that a change in this direction would lead to disinfection being even worse done than at present. I would submit that, on the evidence before me, a change for the worse seems impossible. I have reported, in regard to various subjects, that the evidence was unanimous, meaning thereby that all the witnesses who had expressed an opinion at all had expressed the same opinion: but, as regards the necessity for the closest supervision over disinfection work, if there is to be any approach to honesty and efficiency, the evidence is not only unanimous but almost universal. The remarks of Mr. Reilly and those of the Head-quarters Deputy Collector, Chittoor, on this subject are instructive and are based on personal experience. Mr. Rice and Mr. Blake moreover complain of the *stupidity* of the disinfecting staff. That this absolute and especial condemnation of that portion of our plague work, which has been specially entrusted to certificated sanitary inspectors on account of their presumed superiority in training and character, is a great slur on their reputation is undeniable, but, as I have already observed, this collapse is probably due to the unpleasant nature of the work itself and the constant opportunities for securing illegal gains with little or no risk of detection. I have given a good many illustrations of the inefficiency with which this work is performed, in paragraphs 9-12 of Part IV, and have also commented on the unfavourable influence on popular sentiment exerted thereby. *Curruptio optimi pessima;* it may be that the humbler class of inspectors would be found more satisfactory in the performance of routine duties, which the comparatively highly trained class of inspectors can hardly fail to look upon as a degradation. Mr. Vásudéva Rao lays especial stress on the disgust with which certificated inspectors regard this work. I may add that, in some divisions (for instance, Tiruppattúr and Chittoor), temporary inspectors are even now (irregularly) used for disinfecting work, through its having been found very difficult to induce certificated sanitary inspectors to take up this duty. By way of giving a few salient examples of the general opinion, I may instance the Ootacamund and Salem Conferences, which make a careful distinction between the work of the disinfecting and observation staffs, characterizing the former as unsatisfactory and the latter as fairly good. In Salem, it was observed that the disinfecting staff "must have some one standing over them." Mr. D'Souza (a Bellary supervisor) remarks on their low origin, leading them to unworthy practices. Mr. Bardswell observes that they seem fond of saying that things ought to be done, without seeing that they are done. Mr. Noyce speaks of their constantly giving into the prejudices of the people and doing nothing; Mr. Graham contrasts their inefficiency with the excellent work turned out by the sepoys; even Mr. Ranganátha Mudaliyár, who has no love for sepoys, admits their energy and thoroughness, as compared with the slackness of the disinfecting inspector and his coolies. There is, in fact, but one way by which disinfecting work can be made satisfactory, namely by constant supervision. The method of putting the better class of inspectors on this duty has been tried and seems, by universal consent, to have failed utterly. On all accounts, therefore, I would respectfully recommend that the work of disinfection be no longer confined to certificated sanitary inspectors. If this be approved, an obstacle, which would otherwise stand in the way of the adoption of my suggestions in paragraph 19, is removed.

"Accounts" difficulties.

24. Before entering on the complicated questions arising out of the pay and recruitment of the staff, I may note on one or two questions of administration which have been raised. Mr. Fotheringham and Mr. Lancashire draw attention to the "accounts" difficulties experienced in connection with the transfer of inspectors, coolies, etc., from one set of duties to another. I can only suggest that in such

matters officers should do, what Mr. Fotheringham appears to be doing now, namely make payments in anticipation of sanction, whenever of course no new question of principle is involved and the sanction to be obtained is of a purely formal character. An officer must, in an emergency, be prepared to assume this extent of responsibility nor is he likely to be called to account for it, if he has exercised proper discretion. A point, which seems to me to be of considerable importance, was raised in the course of the Anantapur Conference: "The delay in "notifying infected villages makes it necessary to act illegally, if the notification is "to do any good. If the local officer waited for the publication of the notice, the "villagers would by that time have decamped without passports and would be liable "to spread infection unobserved. A notification published (by beat of tom-tom or "otherwise) in the village should be sufficient publication, and all unnecessary "formalities, which tend to cause delay, should be dispensed with." As observed in paragraph 4 above, an order declaring an area to be infected may be issued by the Collector, subject to the control of Government, and no special means of publication are prescribed. I presume, therefore, that a telegraphic order by the Collector and a publication, by beat of tom-tom or otherwise, in the village would be sufficient to impose on the villagers the legal obligation of taking out passports and otherwise complying with all the regulations relating to infected areas. It would, however, seem desirable that this matter should be placed beyond all doubt, as an adverse decision in the Law Courts might produce undesirable results. Major Jennings (pages 224–225) has made what seems to me a quite admirable suggestion, namely that the existence of an epizoötic amongst rats should be considered a sufficient ground for declaring a place to be infected with plague, even if there be no human mortality. This suggestion has my hearty support. It seems to need no alteration in the existing rules (*vide* paragraph 4 above and section (1) of the Plague Regulations). The importance of the *immediate* passporting of the inhabitants of infected villages has been unofficially brought to my notice in several quarters; it is clear that, when a village is once infected, the prevention of the spread of infection to other villages is, if I may so express myself, likely to be more *remunerative* than an attempt to check the spread of infection within the village itself: both ends should be (and are) aimed at, but, in the face of the scare which so often accompanies the first stage of epidemics, systematic passporting at the very earliest date possible is a matter of vital importance. Classical instances of the spread of epidemics, owing to the desertion of big towns at the commencement of outbreaks, are given at pages 34 and 37 of the Indian Plague Commissioners' report. The desertion of a big town (say Coimbatore) at the commencement of an epidemic may be a good thing, in so far as it renders the systematic disinfection of the town easier, but it is by no means certain that any advantage is gained from the point of the view of the *community*, if the infection is thereby spread broad-cast over large tracts of the surrounding country. Doubtless, in big towns, it is very difficult to effect the passporting of the inhabitants in an absolutely complete way, before they have left the town, but, in villages, it will generally be found possible to achieve this end, especially if my interpretation of the rules as to notification of infection be a correct one; in any case, there is always an additional safe-guard, arising from the fact that the majority of the refugees will be passported at their place of destination, that is to say, before they have (as a rule) had time to spread infection unobserved, always provided that the communication of such notifications of infection all over the district be regarded as a matter of extreme urgency. These considerations, I may note, furnish an additional argument against hurried attempts at drastic measures on the infection of big towns, except in cases where success is certain. Such measures increase the panic of the inhabitants and thereby tend to increase the number of those who flee from the town and carry infection to the surrounding country (*vide* Part VII, paragraph 37). The vital importance of *immediate* formation of preventive circles is generally recognized. Any attempts at a cordon or system of patrol or even the constitution of passport-issuing offices at the toll-gates are, in my respectful opinion, useless, though I note that the constitution of patrols round Adóni was held to be advisable on one occasion (G.O., No. 1405 P., dated 13th November 1902). I submit that the natural effect of such measures must apparently be to increase the terror of the inhabitants and thereby stimulate an "exodus", the dangers of which

Meaning of "publication" of notification of infected areas.

Existence of epizoötic among rats should be considered a ground for declaring an area infected.

Importance of preventing exodus from towns attacked with plague.

the measures themselves seem to me unlikely to modify to any appreciable extent. The Sanitary Commissioner, speaking of cordons, draws attention, on page 21 of the Plague Inspector's Manual, to the fact that persons have succeeded in passing through *lines of troops* and adds that the persons who should be kept out realize in such cases that "where there is a will there is a way." How twenty-four men, on a salary of Rs. 5 a month, could patrol the whole environment of a big town with any prospect of success, how easily this handful of low-paid menials could be evaded, coerced or bribed and how difficult it would be in any case to ensure the giving of correct addresses by the out-going towns-people (a necessary condition for the success of the experiment) are matters which I respectfully submit for the consideration of Government (*vide* Part II, paragraph 2 and Part VIII, paragraphs 18 and 19).

Personal experience of the working of the subordinate plague staff.

25. In reporting on the working of the subordinate plague staff, I may commence with the brief recital of my own experiences, while on tour. The worst specimen of the class of temporary sanitary inspectors whom I came across was working in the Ootacamund bazaars under the eyes of a special plague officer. For mendacity, impertinence and shameless inefficiency, I never remember meeting this man's equal in the course of my official career. The temporary sanitary inspector, who came under my notice at Hospet, was not much better. The inspectors in charge of the observation work at Tiruppattúr and Erode had failed conspicuously in their duties, thereby reducing the checking of defaulters to little better than a farce. The inspector at Kapagallu gave an unconscious indication of the reliance to be placed on inspectors' reports in general (Part III, paragraph 39); the inspectors at Méttupálaiyam and Kurnool were guilty of telling perfectly unnecessary falsehoods, and I can feel no moral doubt that, when the Arkonam inspector told me that the entry of sick people in the village munsif's register was blank, because there were no sick people in the whole town, he was speaking at random. The ignorance of the Periyachettipálayam inspector has already been commented on (Part IV, paragraph 12). It has to be added that I did not, on a single occasion, go out of my way to discover faults but simply undertook the inspection of the routine work of any office I happened to come across; my inspection was mainly confined to the bigger towns but, so far as they are concerned, it was fairly complete, Mangalore, Hosúr, Vániyambádi, Coimbatore and Madanapalle being the only infected towns of any considerable importance whose passport offices I did not inspect. I, therefore, think that I am entitled to generalize from the result of my inspection, so far as big towns are concerned, and to report that, as a class, the urban plague staff are mendacious and inefficient. It will be observed that, in big towns, they will ordinarily get fairly close supervision, but it is clear that even the closest supervision is not sufficient to correct their vices, as is apparent in the case of Tiruppattúr and Ootacamund, both of which are the head-quarters of Special Plague Officers. My inspection notes (printed in Appendix IV) are believed to furnish a justification for remarks, which might otherwise appear to be of too sweeping a nature. I have summed up, in paragraph 27 of Part VIII, the impressions left on my mind as regards the quality of the work turned out.

Incompetence of the staff in towns.

26. So far as the results of the evidence which I have amassed are concerned, opinions vary as to the efficiency of the staff in general, and separate opinions have not always been recorded as regards the work of the urban and rural staffs. It is a significant fact, however, that Chairmen and Secretaries of Municipalities (whose experience is mainly confined to towns) testify, almost unanimously, to the absolute incompetence of the staff as a means of getting early intimation of cases of plague and contrast the comparative efficiency of their own municipal staffs with the incompetency of the special staff appointed for the purpose. In Anantapur, the municipal staff is said to have been used with satisfactory results, and there is no question as to the admirable results of this system in Madras City. Plague has been kept out of the city, mainly by the help of the permanent staff, with the minimum of friction and expense. It was remarked in the Madras Conference, that men who are untrained "learn their work by doing it." In Vellore, the Rev. Mr. Chamberlain (formerly Chairman) and the present Secretary give facts to prove the incompetence of the present staff and the superiority of the municipal subordinates. In the Vellore Conference, it is observed that the plague staff are

"low-paid outsiders" and that therefore people will not talk to them freely. The Secretary observes that "a perfect stranger in an infected town has a greater "chance of making the measures unpopular." Mr. Dutt twice got his first information as to an outbreak of plague through the medium of a Police Inspector's diary: one of these outbreaks was in Vellore, which was under observation at the time. This concurrence of testimony seems conclusive, as regards the inefficiency of the staff in Vellore. Regarding Adóni, the Municipal Secretary writes that the staff have "nothing like conscientiousness or efficiency," and the members of the Adóni Conference describe them as requiring interminable watching and observe that union clerks and schoolmasters would be better than the existing staff. As regards Bellary, the town staff must take their share of the general condemnation of the staff as a whole, and the second Bellary Conference (which consisted largely of non-officials) considers that the employment of the present municipal staff for plague duty would be a step in the right direction (*vide* also paragraph 4 of the Bellary Plague Narrative for February 1904). Mr. Ranganátha Mudaliyár's views about Tiruppattúr have been already quoted. They are confirmed by Mr. Richards, who thinks that peons would do the work of observation as well as the present staff. The Special Plague Officer took a more favourable view of the Tiruppattúr staff, but I cannot say that the results of my inspection were such as to convince me of their zeal and ability. As regards Hosúr, there was considerable variety of opinion (*vide* the Salem, first Trichinopoly and Hosúr Conferences), but these opinions dealt partly with the urban and partly with the rural staff. The notes of the Guntakal Conference show that the opinion of the authorities as regards the working of the staff in Gooty town is most unfavourable. As regards Mangalore and Coimbatore, local opinion is more favourable to the staff. As regards Hospet, Mr. Noyce observes that the observation staff is so bad that their abolition would cause little loss of efficiency, and the Hospet Conference remark that the worst men congregate about towns. Mr. Rice relates how the Tahsildar of Hospet first got information of the existence of plague in his head-quarters in the course of casual conversation with a person 20 miles from Hospet, though there was a plague staff at work in the town at the time.

Inferiority of the special staff to the ordinary municipal staff.

27. Mr. Noyce observes that the present system of sending out men who pass in the second class on reduced pay to take charge of towns and large villages seems radically wrong. There seems some justification for this view, and I apprehend that there are few elements in our plague policy, which have done more to alienate the feelings of the municipal bodies as a whole, than the ignoring of their own staffs in favour of outsiders, whose distinctive qualification is that they have been through a 12 days' course, at the end of which they could not pass their examinations creditably. Can a crudely and imperfectly digested training of 12 days make a stranger, without position or influence, the superior, for purposes of getting information or diagnosing plague or general sanitation, of a municipal servant, who may have worked at practical sanitation for 20 years in one town and is probably on intimate terms with half the residents of the place? Further, even if the training did secure anything approaching equality, would it not seem desirable that the decision should lean on that side which would be most likely to conciliate the sympathies of the towns-people? If municipalities frequently show themselves obstructive and retrograde (and there are, unfortunately, many records to prove this) and if their grievances in regard to plague matters are frequently such as cannot be remedied with due regard to efficiency (*vide* paragraph 7 above), it still is not altogether clear why we should inflict what seems an uncalled for slight on the municipal staffs and thereby deprive ourselves of the services of a class of people who know the "ins and outs" of the town in a way that it would take an outsider years to attain to. I have been asked by Municipal Chairmen, in the course of my administrative work, what they should do, if plague threatened their towns. My reply has always been, in effect "Turn your permanent staff "on to plague duty and fill up their places as best you can." I submit that the facts and evidence adduced in this and the last two paragraphs seem to show that the alternative system now adopted is hardly as successful as might be wished. Further, the system fails to satisfy the only people who are unquestionably benefited by it; the Sanitary Commissioner has recently observed that it is particularly hard

to get the post of assistant inspector filled up; in my opinion, the existence of a grade of assistant inspectors, recruited in the present manner, is unsound in principle and has proved a failure in practice and, if the *general* system of recruitment and training had to remain in other respects unchanged, I should, with all deference but with no hesitation, recommend that this particular grade be abolished and that the observation staff on Rs. 25 per mensem be recruited from the permanent staff of municipal or union establishments or from any other local source that might seem expedient, without the necessity for any more elaborate training than the district itself could supply. I feel convinced that local knowledge and the general sanitary training of years would make such men far more valuable than the grade of assistant inspectors whom they would supplant and I would further submit that local knowledge and a rough and ready experience of sanitation would be a fair return for the expenditure of Rs. 25 per mensem. As I have noted already (Part VIII, paragraph 13), the passport-system seems on the whole to have worked less satisfactorily in towns than in rural areas and I would certainly attribute this in part to the inferior class of men from which the urban observation staff is so frequently recruited.

Inefficiency of the rural observation staff.

28. The rural observation staff are worthy of less summary treatment. In the first place, unlike the urban staff, they have filled a gap for the last five years which there was no obvious means of filling up from any other source; in the second place, they have at least shown sufficient mental calibre to qualify in an examination; in the third place, their work is decidedly laborious, if it is performed with the smallest approach to conscientiousness; in the fourth place, the verdict on their work is by no means universally unfavourable and, fifthly, as far as my own experience is concerned, though the rural inspectors were found to be by no means free from serious faults, they impressed me as having some degree of alertness and self-respect, as compared with the urban staff; in connection with the Ilitorai case, they worked in quite a business-like way. Their main defect, as a class, seems to be their unsuitability for their chief duty, namely obtaining information from the villagers within their ranges. Villagers are a suspicious and reticent race, except among themselves, and outsiders will seldom gain their confidence, except on a basis of long-standing intimacy; further, the persons to whom they are accustomed to look up with feelings of respect are the subordinate staffs of the various branches of the public service; a sudden onslaught on the part of a complete stranger, whose functions, office and personality are alike unfamiliar to them, is by no means likely to command either their confidence or their respect; in such cases, they will naturally follow the advice of their headman; the headman's manner of dealing with the inspector will depend on whether his fears of the sirkar or his personal feelings are uppermost in his mind, and the success of the inspector will, in almost all cases, depend on the tact and firmness with which he can manage the headman; occasionally, a local faction will enable the inspector, if he is a clever man, to get some outside information; the constable or the peon, being local men, will often be able to assist him, always supposing that they are willing to do so; but, on the whole, it must be allowed that he stands alone, facing a suspicious and hostile world; is it surprising that he usually fails to obtain any information, until matters are past concealing? His position, as compared with that of any district subordinate, is one of extreme difficulty, and it cannot be said (especially so far as the temporary inspector is concerned) that there is anything in his antecedents to lead one to expect him to surmount the difficulties of his position in a satisfactory or creditable way, unless he is an exceptionally clever member of his class; he has little of importance to tell the villagers, in relation to his own special subject, which they do not know almost as well as he does (Part V, paragraph 55, and Part VIII, paragraph 29) and he has little to appeal to, except their fears of further interference on his part. A real enthusiasm for sanitation on the part of the inspectors might end by inspiring some of the villagers with similar feelings and compel their respect, but how can an enduring love for sanitation be infused by 12 days' training? Besides, in sanitary matters, villagers are accustomed to look to the civil apothecary or hospital assistant, members of the public service for whom, as a class, they seem to have a feeling as near akin to affection as an outsider and an official is capable of inspiring in their minds.

29. Five years of experience has not succeeded in modifying the distrust of the villagers, a thing which cannot be considered surprising, when it is remembered that a circle is seldom worked for any considerable length of time by the same incumbent, members of the staff being liable to shifting, hot-weather reductions and dismissals and being also prone to resign after a short experience of the life. As the relations between the staff and the villagers are a point of cardinal importance, I think it advisable to analyse the evidence in detail. That the staff get no information from anybody but the village headman was the opinion expressed at the Bellary, Adóni, Hospet, Vellore, Chittoor, Salem, Anantapur and Guntakal Conferences: Mr. Clegg and Mr. Walsh, however, consider that they sometimes have other means of information. Again, as regards individual opinions, Mr. Andrew, Mr. Macleod, Mr. Carr, Mr. Rice, Major Wright, Captain Atal, Father Rondy, Mr. Coleridge, Mr. Noyce, Mr. Graham and Mr. Krishnamáchári think that the village headman is their only source of information. The Hosúr Conference was divided in opinion. It was noted in Vellore and Bellary that factious villages might furnish an exception. It was, however, observed in Vellore that a villager giving information, under such conditions, "would risk injury at the hands of his "fellow-villagers." In Coimbatore, it was considered that inspectors could get information from the leading villagers and Mr. Fotheringham believed that constables helped them. Mr. Pinhey, Mr. Spencer and Major Ffrench found that the circle staff got information apart from the village officers and Mr. Giri Rao thinks that this is sometimes managed by tactful inspectors, but very rarely. The overwhelming weight of opinion on one side, as against the few opinions on the other side, sufficiently indicates the *general* truth of the conclusions arrived at in the last paragraph, whilst it is also clear that a few individual inspectors can rise superior to their conditions, a fact which is of course to be reasonably expected. Some individual expressions of opinion may be noted. Mr. Krishnamáchári notes that such expressions as "could not check passports, as patel was absent" "could not "trace out the case, as the patel was not in the village" are very common in inspectors' diaries. Mr. Nílakanta Mudaliyár thinks that very little of their work is done by personal enquiries. It is noted in the Bellary Conference that they "do not "command the confidence of the people" or understand them; similar sentiments were expressed in slightly different words at Kurnool and Guntakal. Mr. Graham notes that sometimes, to his knowledge, inspectors were refused admission into a village and that they are quite helpless in the face of any opposition: he also observes that cases are seldom detected, until the patient is dead or dying: this was also observed at the Guntakal conference and by the Secretary of the Adóni Municipality. On this point, Captain Gabbett remarks that he knows "of no case "in which the observation inspector has detected the first case of sickness from "plague in a previously uninfected population and in which the discovery has prevented an epidemic . . . . . , but they have certainly over and over again "brought to notice the existence of an epidemic in its earlier stages." On the other hand, a Coimbatore Supervisor considers that "they are liked on the whole; people "asked that particular inspectors should not be transferred," whilst Mr. Vásudéva Rao tersely remarks that "their work makes them necessarily unpopular."

Opinions of witnesses.

30. Special defects frequently aggravate their difficulties. Mr. Noyce deals with this subject very fully and speaks of the friction so often caused by the inspector, who, "clothed in a little brief authority, asserts it unnecessarily, by "reporting the village officers for petty misdeeds." Mr. Macleod notices their tendency to complain about trifles. Mr. Noyce speaks of their difficulties, on occasions, in speaking the language of the people. This point was touched on by the Hon'ble Mr. Andrew and Mr. Macleod and in the first Bellary Conference. Mr. Bards well observes that they "should be able to explain more clearly than they "can always do now the necessity for the measures which they have to enforce." Major Ffrench observes that the training is too much confined to Brahmins, whom he found "generally bursting with knowledge and ready to air it," but "reluctant "to go into houses occupied by the Pariah caste, when there was plague amongst "them." It will be observed that Major Ffrench is one of the very few officers, who entertain a *generally* favourable opinion of the efficiency of the observation staff in the matter of getting information. Mr. Robertson doubts "if the inspectors really

Special defects observed in the staff.

"visit all the villages they say they do" and gives an instance of the submission of a false report on this point by one of their number. Mr. Vásudéva Rao notes that some of them are sickly or mere boys. There are other complaints in regard to the physical fitness of many of the inspectors, but the best witness on this point is Captain Cornwall, who observes:—"I frequently examine batches of men for selection as "temporary sanitary inspectors and I find it very difficult to get a sufficient number "of suitable men. Many of the people who apply are either very young or are old "men who have failed in some other branches of life, as schoolmasters frequently. "Some are good, but many are by no means the stamp of men we would select, if "there were any choice." So far, as regards the temporary men. Captain Cornwall adds "Even the men who come up for the certificate course are frequently not up to "the mark physically. It is not an attractive life and there are elements of risk in "it and that is probably the reason why better men do not present themselves."

Class of men from which it is recruited.

As regards Captain Cornwall's remarks as to the *class* from which inspectors are ordinarily drawn, there is ample corroboration. Mr. Scott knows of a case in which an applicant for a peon's post was given the post of a circle inspector. Mr. Rice speaks of private vakils, vakils' clerks on Rs. 10 and failed dufterbands not good enough for a post on Rs. 7½; Mr. Blake knows of a karnam on Rs. 8 who got the post of inspector; Mr. Noyce observes that many of them have tried to obtain clerkships without success; Mr. Knapp complains of having been provided with a dismissed salt sub-inspector; the Head-quarters Deputy Collector of Kurnool speaks of a schoolmaster resigning and getting a post as inspector; Mr. D'Souza speaks of sweetmeat-sellers and kerosine-oil vendors being included in their ranks and observes that the staff has greatly deteriorated since 1898. In Anantapur, it was observed that many of them were men who had failed in other departments. Many of them have no interest in their work; in a recent article in the *Hindu*, it was stated that some had been imprudent enough to let their lack of faith in disinfection be known; this receives some confirmation from my evidence; in the second Bellary Conference, it is stated that "they have no faith in disinfection "and think it a farce themselves." Their work as disinfectors has been fully dealt with in paragraph 23 above, to which reference is solicited. Again, many of them possess a low standard of education, cannot write a proper diary and are lacking in general intelligence (evidence of Mr. Andrew, Mr. Rice, Rev. Mr. Chamberlain, Mr. Coleridge, Mr. Noyce, Mr. Vásudéva Rao, Mr. Saldhana, Mr. Krishnamáchári, Mr. D'Souza and Mr. Giri Rao). The majority of the temporary inspectors and a fair proportion of the certificated inspectors would not be eligible for the subordinate ranks of the Revenue department (*vide* the two statements printed in Appendix VII). The temporary inspectors, employed in connection with the Sembiyam out-break, are described in the Madras Conference as a regular rabble.

More serious faults ascribed to the staff.

31. So far as more serious faults are concerned, the evidence varies in different districts. In Bellary and Kurnool, I was furnished with lists of dismissals, which are printed in Appendix VII. There can be no doubt that the proportion of the staff, who have had to be subjected to this penalty in these districts, is very large, 17 in Bellary within a period of eight months, and ten in Kurnool within the current year, that is to say, about 20 per cent. in Bellary and about 30 per cent. in Kurnool. Mr. Robertson, Mr. Noyce and the Hosúr Conference have also given me a few statistics on this point. I have already alluded (Part IV, paragraph 12) to the current belief entertained in Anantapur and elsewhere that they sometimes foster plague in order to prolong their appointments. Mr. Noyce gives an instance of what, on the most favourable hypothesis, must be considered almost criminal stupidity. "A small village of about 500 people . . . was voluntarily evacuated by the people on account "of three or four deaths from plague at the beginning of January. Twenty-eight "deaths occurred in the rest of the month, which were without exception ascribed "by the inspector (a temporary man) to simple fever, and measures (or rather no "measures) were taken accordingly." An instance of similar conduct on the part of a medical subordinate in the Salem district came to light in 1902, but I find no more recent instances of anything of the sort, so far as medical subordinates are concerned. It will be observed that the number of instances in which dishonesty is *proved* is not very large. This is, of course, natural enough, even on the

assumption that it frequently exists, as, in such cases, the price is usually paid for services rendered and nobody realizes that he has any particular reason to complain. The natural and the only apparent result of such venality will, in most cases, be general inefficiency, and this is exactly what the statistics indicate. As was observed at Guntakal, "Such cases are difficult to substantiate" [and the people] "are afraid to come forward and substantiate their complaints. The inspec-"tors have to be punished for inefficiency, not dishonesty;" or, as Mr. Chamberlain's information leads him to believe, "dishonesty sometimes takes the form of threat-"ening to report cases of sickness as plague but more commonly takes the converse "form of offering for a consideration to suppress true or suspicious cases." Mr. Campbell's and Father Rondy's views are much the same. On the whole, however, I doubt whether there is *much* black-mailing amongst the observation staff; they have hardly sufficient power; as Mr. Fotheringham observes, they could only commit extortion by securing the complicity of the village munsif: as Mr. Macleod, Mr. Rice, Mr. Spencer and Mr. Graham observe, it is chiefly in regard to disinfecting work that there are complaints of dishonesty. Inefficiency is, probably, in most cases, the result of carelessness, indifference and timidity, and perhaps also arises from the fear of being falsely accused, if they do their work properly: as Mr. Brodie observes, "if a man is strict, there will be "complaints; still more, if he is tactless." That false complaints are sometimes made against inspectors there is every reason to believe. So far, therefore, as honesty is concerned, neither complaints nor their absence are conclusive proof, one way or the other.

32. That the staff, as at present organized, is a most unsatisfactory agency for observation work (especially in towns) and a still worse agency for disinfection work (especially in rural tracts) seems to follow immediately from the evidence (paragraphs 23 and 25–31), and this is my own conclusion; I have also endeavoured to indicate the chief characteristics of the staff, which make for inefficiency, and the way in which these characteristics follow from the manner of their recruitment; apart from their *personal* characteristics, their ignorance of the people amongst whom they have to work and their lack of official prestige are conditions which place them at an immense disadvantage; moreover, their origin is frequently obscure and their attainments of the humblest order; their previous career presents one salient characteristic—failure; they have failed, sometimes as clerks, sometimes as schoolmasters, sometimes even as peons and dufterbands; I trust that Mr. Knapp's case (the dismissed salt officer) is an exception; but a record of previous failure (or immaturity) is what distinguishes them, *as a class*, from permanent Government servants; that there are exceptions to this rule is agreed to in all districts, and energetic and constant European supervision has got some good work out of them in the past and will doubtless continue to get some good work out of them in the future, even under existing conditions; supposing, therefore, that no fundamental improvement is found practicable in their recruitment, there is no reason to anticipate that their inefficiency will result in an absolute break-down of the system, but I cannot doubt that improvement, if it can be effected, is eminently desirable and seems worth some sacrifices on the part of those concerned, considering the magnitude of the interests involved.

33. Put in the most general way possible, the only remedy, which suggests itself to me as likely to be effectual, is that the subordinate plague staff should, in every possible way, be welded into the ordinary district administration: it will, I think, be conceded, having regard to what has already been written, that the apathetic and semi-hostile attitude of the people at large would be likely to disappear wholly or in part, if the subordinate plague staff had the prestige, which intimate connection with the permanent Revenue and Medical departments would confer on them, still more so, if the inspectors (or a reasonable proportion of them) were actually members of those departments, but the advantages are by no means confined to their relations with the people. That the present staff is to a great extent out of touch with the local administration of most of the districts will hardly be gainsaid in the face of the evidence; everything which can bring the subordinate plague staff more into line with the ordinary revenue staff

It should be welded into the ordinary district administration.

will tend to the promotion of harmony, discipline and efficient working; I have already discussed one or two changes in the existing administration which, in my respectful opinion, will tend in this direction (*vide* paragraphs 9 and 19 above). Again, the present staff is wholly without permanent status or prospects, nor, while it is simply regarded as a staff recruited purely for plague purposes, is it easy to remedy this; while this is so and while any member of the staff is liable at any moment to have his services dispensed with (a liability which becomes anything but remote, as the quiescent season approaches), it is difficult for the staff to have their heart in their work; there will always be a tendency, as one Conference puts it, "to make the maximum amount in the minimum time." The incessant tendency of the staff to resign on frivolous grounds has already necessitated the intervention of Government (*vide* G.O., No. 375 P., dated 23rd February 1904; also paragraphs 16–17 above). Again, the present state of things is undoubtedly one of the chief reasons for the very serious expenditure involved in the entertainment of the staff. That their pay is utterly disproportionate to their *value* is universally avowed: that their pay can be safely reduced, under the existing conditions in regard to recruitment and having regard to the nature of the work and the prospects (or rather, lack of prospects) of the staff, is by no means equally certain. In short, everything which tends to identify the staff with the permanent local administration will make for efficiency, cheapness and popularity.

Proposal to establish a sanitary department considered.

34. The subject-matter of this report is a strictly limited one: I am simply called on to discuss the manner in which plague in this Presidency can be best controlled and it is no part of my duties to consider the future policy of this Presidency in regard to general sanitation: it seems unnecessary for me, therefore, to discuss the analogies from the English health department, which have been suggested from time to time in the course of discussions on plague administration. The practical connection between the promotion of general sanitation and the suppression of plague seems remote and secondary (Part III, paragraph 51); if these two objects are confused, failure to achieve either object is to be feared; that the suppression of plague is the object which calls for more immediate action hardly admits of a doubt. As remarked by the Sanitary Commissioner with deliberate emphasis, the plague inspectors' "*great function is the taking of measures to detect and "sanitarily treat imported cases of plague, with such rapidity as to prevent the possibility "of indigenous cases supervening*" (Plague Inspector's Manual, 32), and this function is carefully contrasted with that of attention to general sanitation, a second and subordinate place being assigned to the latter. Clearly, therefore, everything which simply subserves the secondary purpose should be ruthlessly brushed aside, if greater efficiency can thereby be secured in regard to the primary and important purpose. The possibility of dealing with plague more efficiently by means of a *sanitary department* was suggested by some members of the Indian Plague Commission but was deliberately rejected, after due consideration, by the official members of that commission and subsequently by the heads of all responsible Indian administrations. Dr. Oliver is the only witness, whose views tend in this direction. They are printed in Appendix VI-B. The result of five years' additional experience in this Presidency is, I submit, to entirely confirm the opinions formed in 1899: the evidence seems to indicate very clearly that the most efficient instruments for dealing with the disease are to be found in the ranks of the subordinate Medical and Revenue departments, their work continuing of course to be controlled by sanitary principles and guided by expert advice.

Proposals for creating a permanent plague department, as a branch of the revenue establishment.

35. The practical difficulties are sufficiently formidable. Last November, there were about 300 plague inspectors under employment, of whom about 100 belonged to the certificated, about 130 to the temporary and about 66 to the assistant grades. The number was probably greater in January. Leaving aside the certificated inspectors (whom I would not wish to disturb, for the present at any rate) and leaving aside the assistant inspectors (who could, I believe, be replaced, wholly or for the most part, by municipal and local fund servants), there remain (say) 140 temporary men, the bulk of whom could, as I believe, be replaced with advantage by hospital assistants or revenue subordinates. Objections on the part of such subordinates to undertake plague duty could be met

partly by inducements and partly (where necessary) by definite compulsion, but the effect on the work of the departments thus reduced and (primarily) the problem of filling up vacancies are matters which cannot be disregarded. Anxious consideration and constant discussions with officers of experience have led me to discover only one reasonably satisfactory solution of these difficulties, namely the creation of a permanent department in connection with our plague organisation. Taking what seems to me a bare minimum, I would recommend that 70 posts (with a pay of Rs. 40 and Rs. 35) be made permanent and pensionable, that they be filled up (at the discretion of the Collectors of certain selected districts) from the subordinate ranks of the various permanent services or from the ranks of deserving certificated or temporary inspectors, that the services of any certificated or temporary inspector, who is confirmed in one of these posts, be made pensionable, with effect from the date of commencement of his *continuous* service as certificated or temporary inspector, that every Government servant confirmed in such an appointment be "seconded" during his period of service and entitled, on return to his own department, to promotion in accordance with his rank when he left it, that certificated and temporary inspectors confirmed in such posts be eligible for enrolment in the permanent ranks of any Government department, that the age limit fixed for entrance into the subordinate ranks of the Revenue department and other branches of the public service be relaxed in their case and, lastly, that applications for exemption from examination rules be favourably considered in their case, where the Collector is able to recommend such a course with due regard to the exigencies of the public service.

Methods of "absorbing" it elsewhere, if plague disappeared.

36. The chief risk involved in such a scheme is the possibility that, when plague has finally disappeared (a somewhat remote contingency, perhaps; this subject is alluded to in Part XI), employment may have to be found for a certain number of the permanent officers of the special department (all those who originally belonged to any *permanent department* would be gradually re-absorbed into it, as vacancies occurred) or that, if no use could be made of them, they would have a claim for compensation pensions; as regards this question, I can hardly think that there would be any difficulty at any time, considering the sanitary needs of the Presidency, in gradually absorbing 70 (or even 100) officers of this kind in the permanent local or municipal staffs or finding suitable work for them as itinerating sanitary inspectors, a function for which their previous duties would have been an admirable training. Mr. Mullaly has favoured me with some observations on this point, which are printed in Appendix VII. The services of the permanent staff as plague inspectors would presumably not come to an end *abruptly* and, as the number of inspectors required all over the Presidency diminished, the strength of the permanent portion of the department could also be gradually and proportionately reduced, by not filling up permanent vacancies as they arose. The cost of all these pensions would no doubt be an additional burden on the public revenues, in so far as the ranks of the new department were *not* filled up by persons holding permanent appointments, but this would be a burden distributed over many years, and I cannot see why long service on plague duty should not be held to establish as good a claim to a provision for old age as any other form of service under Government. My suggestion would, of course, be of a more effectual nature from the point of view of plague administration, if the number of permanent appointments were made greater than 70; the possibility of this is a matter which I submit for the consideration of Government, should my general scheme be deemed worthy of acceptance in any shape or form.

Probable effects of the proposed scheme.

The general effects of such a scheme might be expected to be numerous and far-reaching. As regards the certificated or temporary sanitary inspectors who were made members of the permanent staff, their new position would at once give them an immense increase of prestige in dealing with the villagers in their circles; again, it would give them a sense of responsibility; they would feel that they had much to gain and much to lose; dismissal would no longer leave them much as they were before; the district authorities would have a real hold on them; it would be possible to give practical and substantial recognition of good work. Permanent revenue or medical subordinates, again, could be transferred to plague work in a methodical way, and their places could be filled up with far less difficulty, the vacancy being *permanent;* the "accounts" difficulties now experienced

would probably vanish. Again, as regards the remainder of the certificated and temporary staff, all the advantages enumerated above would ensue to some extent in their case also, though in a less heightened degree; *every* certificated or temporary inspector would feel that, by good work, he would at least increase his *chances* of permanent employment, as vacancies in the permanent staff arose; he would feel that, if he eventually secured a permanent billet, the work done meanwhile would have helped to augment his service and pension; that his services should be dispensed with in the hot weather would mean a possible *break in his service*, and it may be surmised that every plague inspector, who was worth his salt, would do his utmost by good work to be selected for retention at that period; there would be far fewer resignations, when an epidemic broke out; a better class of men might be expected to come forward for recruitment in the ranks of temporary and certificated sanitary inspectors and there would be a possibility of more careful selection and rejection than Captain Cornwall finds possible under the present system. The villagers would have more respect for a man, who might at any time get a permanent footing in the district. The bearing of these suggestions on possible modifications in the present scale of pay and allowances is discussed in paragraph 41 below.

Distribution and pay of the new department.

37. As regards the distribution of the new department, I should be inclined to suggest tentatively 20 permanent appointments being in the gift of the Collector of Bellary, the same for Salem, 14 for Coimbatore, 10 for the Nilgiris and 6 for North Arcot. These appointments being in the hands of the Collectors of selected districts, the department would naturally come to be looked upon as an appendage to the ordinary Revenue department, but I do not think that any permanent revenue or medical subordinate should be compelled to serve more than two years in the special department, and good services in that department should always be considered a ground for exceptional promotion afterwards. An appointment in the special department, though it should not be at the discretion of any subordinate to refuse it, should, as far as possible, be given to subordinates who wished for it and, when it was given against the will of any subordinate, it should involve definite pecuniary advantage as regards *pay* (apart from allowances). For example, a third-grade hospital assistant or a second-grade revenue inspector, when forcibly enrolled into the department, should always be given a 40-rupees' vacancy. Half the posts should, I think, be made to carry a salary of 40 rupees and the other half 35 rupees. Deserving certificated men might be drafted into the 40 rupees' posts (first grade) and temporary men (in the first instance) into the 35 rupees' posts (second grade). The existing method of recruitment, namely deputing subordinates or outsiders to the grade of temporary inspectors (or, as I should prefer to call them, second-grade special inspectors) would still remain open, but these posts would only carry a pay of 35 rupees, whereas some of the permanent posts would carry a pay of 40 rupees, as explained above (*vide* also paragraph 41 below and Appendix VII). This would make the pay analogous to that of revenue inspectors, and the incumbents might perhaps be denominated *special* (plague) inspectors; their allowances would have to be such as to compensate, in part, for the disagreeable and responsible nature of their duties. At least one-third of the total number of permanent appointments should, I think, be filled up from the ranks of certificated or temporary inspectors, and as many more as might seem desirable, at the discretion of the Collector. This would not, I think, hamper Collectors unduly. Even in Bellary, there must be *seven* inspectors, whose permanent services would be of use to the administration either in the Revenue department or in their present capacity or as ordinary sanitary inspectors; as far as possible, men should be selected who are likely to be eventually useful as taluk head accountants, "Accounts" clerks or even Sub-Magistrates; otherwise, they may tend to block the department; permanent vacancies could be kept open in the special department at any time, either under orders of Government or at the discretion of the Collector; I think that certificated inspectors should have no right of securing vacancies in preference to the temporary staff; the only distinction that seems necessary is that certificated inspectors, when appointed, should be always put in the *first* grade and temporary inspectors (in the first instance) in the *second* grade.

38. It may justly be urged that it has not hitherto been usual to consider approved services of a hard, disagreeable and dangerous kind, as compensating for absence of the usual qualifications for revenue service; but, there must, I submit, be a certain amount of give and take in matters of this kind. If the Revenue department is not prepared to undergo any risks or make any sacrifices, in order to further the fight against plague (and I fully admit that this is a tenable position to take up), the complaints against the existing staff and the universally expressed desire for men with a permanent stake in the administration resolve themselves into little more than a particular case of the natural and universal (but unfruitful) tendency to find fault with the thing which is. Unpleasant facts must be looked in the face. An observation staff is a necessary part of our plague policy; the observation staff, as at present constituted, is very highly paid, yet satisfactory men cannot be found for it; there is a deterioration in the quality of men coming forward for the post, and the Sanitary Commissioner finds it increasingly difficult to get any men at all for training. It seems plain that, if better men are to be got for less pay, some extra inducements must be held out. This is also the view of the Sanitary Commissioner, who is convinced that some hope of permanency in plague appointments is the best means of securing efficiency combined with economy. Now, there are, at present, about 240 certificated and temporary inspectors employed; my proposal gives at least 10 per cent. of them (and anything more up to 30 per cent.) a certainty of a pension; this percentage of employés would also have the chance of absorption and further promotion in the Revenue department; the remainder of the plague staff would have the chance of securing these certainties and chances for themselves, as vacancies occurred in the ranks of the special department. The greater the size of the special department, the greater the risk incurred by Government and at the same time the stronger the incentive for good plague work; the size at which the department should be fixed depends on the striking of a balance in regard to these advantages and disadvantages; an experiment (on the limited scale proposed) might perhaps be the best means of arriving at an accurate judgement as to the proper proportions which the department should finally assume.

Proposals for improving the plague staff in towns.

39. So far as assistant inspectors are concerned, I have endeavoured to show (paragraphs 25–27 above) that their work is particularly unsatisfactory and recognised as being so. The difficulty is to combine efficiency with the low rate of pay now in force in towns. This can only be met in one way that I can see, namely by allowing the local authorities discretion to increase the area in charge of each inspector to (say) 1,500 houses or 6,500 persons, if they think that they can thereby procure local men with fair qualifications and (best of all) municipal servants. Thus, in Vellore, where there are now five assistant inspectors (working extremely badly) on Rs. 25 a month, it would be possible, by reducing the number of circles to four, to obtain, without additional expense, three inspectors on Rs. 30 and one on Rs. 35. An arrangement of this kind would frequently make it possible to depute members of the permanent municipal staff to the work or to secure the services of at least one *passed* sanitary inspector. I would respectfully suggest that, if the present general system of training is to continue, the rules be amended in two directions (1) by letting the term, assistant plague inspector, include not only persons trained by the Sanitary Commissioner (*vide* paragraph 8 above) but also persons selected for local knowledge and trained for one month by a supervisor or some higher authority to the satisfaction of the Collector; (2) by retaining the portion of section 56 relating to urban circles *as a suggestion* for all towns, municipal or non-municipal alike, but adding that it should be open to the Collector to increase the area of the circles at his discretion, subject to the condition that an expenditure of Rs. 25 for every 5,000 persons (or 1,200 houses) or, as an alternative, of Rs. 30 to 35 for every 6,500 persons (or 1,500 houses) will ordinarily be regarded as the minimum of efficient expenditure for purely plague purposes, independently of supervision. For supervision, the minimum that should be paid to each divisional inspector is, in my opinion, Rs. 40 *plus* Rs. 15, and this post should always be held by a certificated inspector, as at present; but I would increase his possible range to three of the larger or four of the smaller circles indicated above; in other words, he should ordinarily be called on to supervise any number of persons up to 20,000.

As will be seen below (*vide* paragraph 41), this pay, in comparison with the revised pay suggested for rural areas, will be relatively far more favourable than at present and should enable municipal and union authorities to get exceptionally good men. I can see no reason why a divisional inspector should be paid less than a rural circle inspector: in this view, I have the support of Mr. Robertson, amongst others. There should be at least one divisional inspector for every town of more than 15,000 inhabitants. Thus, a town would have to spend at least Rs. 25 for every 5,000 persons or Rs. 30 to 35 for every 6,500 persons, for observation; for supervision, the minimum expense would be Rs. 55 for every 20,000 inhabitants; the other principle to be maintained is that plague work should not, in any circumstances, be combined with ordinary municipal work; on the other hand, I would allow municipal authorities considerable latitude in the way of filling up, as best they could, vacancies in the permanent staff, caused by deputation to plague duty, and would not insist on such vacancies being filled up by *trained* men, provided that the men selected had some experience of practical sanitation and a fair acquaintance with the town they were to work in. These suggestions are not intended to act in the direction of *economy*, which, so far as towns are concerned, seems to me by no means feasible or desirable (except so far as plague allowances are concerned—*vide* paragraph 41 below); their object is to allow freer scope for engrafting municipal and local servants on the plague staff and for eliminating, to such extent as may be found desirable, the existing assistant inspectors, without the necessity for replacing them by other members of the same class. There is no objection whatever to the Sanitary Commissioner or the District Medical Officer or any other authority keeping a register of all candidates, who have gone through the prescribed course and failed to qualify, nor is there any objection to such persons being given employment in municipalities and unions, if such a course seems expedient in any given instance; but I do not think that such failures should be *forced* into appointments, to the exclusion of men of humble attainments but local knowledge. It may seem as if these proposals involved the fallacy that an inspector will have his capacity for *work* increased by an increase of pay. I base my proposals, not on the assumption that a man with a large circle on high pay will be able to do more actual work than a man on less pay with a smaller circle, but that the higher pay will enable the local authorities to get a man of more local knowledge and influence and one who will therefore be able to get information more easily than a man of an inferior class on smaller pay and will thus work a larger circle with equal facility and better results. The house-to-house visitations and other *routine* methods, by which assistant inspectors seem as a rule to justify their existence, are in my respectful opinion simply futile. What is wanted is an intelligent working of the rules and intelligent subordinates to work them (Part VIII, paragraph 27). How far I am correct in the assumption that local men could work larger circles than the present staff with equal facility and greater success can be best seen by results: if my proposals are not taken advantage of in practice by the local authorities, it will be clear that the present system is less susceptible of improvement than I had supposed. The amended rules which I suggest are no more detailed than the rules which they are intended to replace and, like the existing rules, will demand some elasticity in the working. In framing these suggested rules, I have intentionally concentrated attention on the *amount* to be expended rather than on the *way* in which it is to be expended, thinking that the latter question can practically be left to the local authorities, subject always to control and supervision, when found necessary. I note that the views expressed in this paragraph are not in accordance with the rules laid down in paragraphs 18 and 19 of the Rules for the Prevention of Plague in Municipalities. It will be observed that they meet the case of all towns with more than 5,000 inhabitants and thus include the information called for in G.O., No. 1165 P., Mis., dated 6th September 1904.

Evidence and opinions on these proposals.

40. I have now to review the evidence which bears on the proposals submitted in paragraphs 35–39 above, it being clear that my conclusions and the general arguments advanced in support of them require considerable support from the district administrations, if they are to deserve any consideration at the hands of Government. My scheme originated in a suggestion made at the Salem Conference: the passage runs as follows:—" All the gentlemen present consider that a permanent

"staff would be a great improvement on the staff in its present condition. Mr. "Clegg and Mr. Richards consider that this is only practicable, if the permanent "staff of the district is increased, and suggest the desirability of treating some "of the plague appointments as permanent and pensionable. If this were done, "vacancies caused by the appointments of permanent revenue subordinates on "plague duty could be *permanently* filled up, and this it might be possible to do. A "further means of popularizing the plague services would be, in the case of a man "doing good work and being eventually given a permanent appointment, to treat "his plague duty as permanent service for the purpose of a pension. The prospect "of a pension is a great incentive to hard work and good conduct. The Tahsildars "remark that their clerks would like such billets, if they were permanent. Per- "manent appointments in the plague staff should be open to men of any department, "Revenue, Police, Subordinate Medical Service and so forth." Salem is a district, whose experience in plague matters is second to none in duration and intensity, and it will be observed that my proposals are little more than an expansion of those contained in the extract from the Salem Conference given above. The Ootacamund and Anantapur Conferences have supported these proposals, and they meet with Mr. Cowie's general approval on the merits, but not Mr. Carr's. Mr. Bird (Coimbatore) has adumbrated a somewhat similar scheme (Appendix VII) and Mr. Fotheringham's remark that "no one wishes to spend his life on plague "work," though perfectly just, does not affect the scheme which I have supported nor the scheme which the Salem Conference intended to propose. These are the only direct opinions procured in regard to the scheme as a whole; it will be observed that they include the opinions of responsible officers in all the districts which are most deeply affected with plague. The scheme was not suggested to me at a sufficiently early date to enable me to put it before all my witnesses. This being so, I am obliged to rely to a great extent on the *indirect* support given by the witnesses to my scheme. Broadly speaking, I rest my case on five propositions, the acceptance of *all* of which would seem to be sufficient to prove that my scheme (or some similar scheme) is necessary, if any radical improvement is to be effected in a branch of the administration, which stands in urgent need of it: (1) the *personnel* of the plague staff stands in urgent need of improvement (paragraphs 28–31 above), (2) the pay of the plague staff is too high (paragraph 41), (3) these defects are largely due to the poor prospects of the staff (paragraph 42), (4) an infusion of permanent subordinates in the plague staff would be a great improvement (paragraphs 43–44), (5) such a course would give rise to difficulties in the departments indented on (paragraph 45). The first proposition I have already endeavoured to establish. I shall now proceed to analyse the evidence in regard to the remaining four.

41. So far as pay and allowances are concerned, opinion is practically unanimous in thinking the present rates (Rs. 70 and 75) far too high for rural areas. The rates suggested for combined pay and allowances vary from Rs. 45 to Rs. 60; but, on the whole, the consensus of opinion would be met by an unvarying rate of pay of Rs. 35 for a temporary inspector and Rs. 40 for a certificated inspector, with a pony allowance of Rs. 15 per mensem for all work involving travelling, whatever be the *nature* of the work. The existing allowances are (*a*) fixed travelling allowance, (*b*) pony allowance, (*c*) plague allowance and (*d*) hill allowance. The elimination of (*a*) and of every other kind of travelling allowance whatever reduces the pay to the amount generally considered proper. The remaining three allowances will be considered in order. (*b*) Whenever a pony allowance is drawn, a pony should be kept and used. That the pony should be capable of being used and should be used is a matter of administrative detail, but an important one. I have been told of inspectors who were found to be unable to ride, after they had been drawing their pony allowances for months, and Mr. Rice speaks of an inspector who called the word "allowance" an "unfortunate misnomer", the extra amount being, according to him, merely intended as an increase to his pay. It is also considered advisable that the option of keeping (and using) a bicycle should be given to the inspector; I agree with this suggestion. In Malabar and South Canara, it seems doubtful whether either a pony or a bicycle would be of any use (*vide* paragraph 13 above): I should be disposed to substitute, in the case of rural circles in the West Coast, a *special* allowance of Rs. 5, in addition to the pay of the inspector. All the

Opinions as to present rates of pay:—

Pony allowance.

allowances dealt with above are of course confined to rural circles and preclude all claims to any travelling allowance whatever; for large towns (*i.e.*, towns with 5,000 inhabitants or more), one or more stationary plague officers are required and may best be appointed on the principles laid down in paragraph 39 above. For these inspectors, no travelling allowance of any kind is required in addition to their pay, except in the case of divisional inspectors, who should be treated, I think, exactly like rural inspectors; but, if members of the permanent municipal staff be deputed to the work of observation (which seems to be the best arrangement), a deputation allowance of Rs. 5, in addition to their ordinary salary, should, I think, be given them, in consideration of the nature and responsibility of the work. Any assistant inspectors, who are retained, can continue to draw Rs. 25, as now. By exception, I may note that there is a difference of opinion as regards the necessity for a pony allowance for circle inspectors in Ootacamund town. I should not myself think such an allowance necessary, if the hill allowances be arranged on the scale suggested below. All the suggestions made in this paragraph are more or less in accordance with the opinions expressed by the various witnesses and (so far as certificated inspectors in rural areas are concerned) agree with Colonel King's suggestions contained in G.O., No. 674 P., dated 2nd May 1904. If, so far as urban appointments and the pay of the temporary inspectors are concerned, they fall somewhat short of Colonel King's suggestions, it will be observed that the degree of permanence which I am suggesting for at least some members of the staff goes considerably beyond what Colonel King contemplated in the matter. Moreover, my suggestions are based on the theory that the special inspector's position should be made analogous to that of a revenue inspector, the additional Rs. 15 (or Rs. 5, in the West Coast) operating as a compensation for the disagreeable character of the work. This is an analogy which has commended itself to many of the officers consulted and would accentuate the position of the special department as a branch of the ordinary district administration. The fact that the pay of disinfecting inspectors has hitherto compared unfavourably with that of circle inspectors seems to have acted prejudicially on the recruitment for this branch of plague work (*vide* Part IV, paragraph 10, and also paragraph 23 above); my proposal completely removes all distinctions in this respect (a point on which Colonel King laid stress, in the Government order quoted above) and also removes one objection to frequent transfers from the one branch of their work to the other; such facility of transfer has already been suggested as advisable on other grounds (paragraphs 17–19 above). (*c*) There is a very general opinion that a plague allowance is unnecessary and inadvisable and that it mainly operates as an incentive to inspectors to try and keep plague in their divisions and send unnecessary reports of bogus cases of plague. Mr. Lobo (Mangalore) remarks that "there are certain "wards, which generally keep free from plague, and it is sometimes due to the "exertions of the circle inspector that this is so. It would be a poor consolation to "the circle inspector to be deprived of this allowance, once he succeeded in getting "plague out of his ward. Further, once a ward is free from plague, this is the "time when a circle inspector should exert himself more to see that it does not "get infected again." These remarks have my entire concurrence. The plague allowance under consideration here is wholly distinct from the plague allowances now drawn by hospital assistants on plague duty, the retention of which is suggested in paragraph 45 below. I trust that my proposals for improving the *prospects* of the staff, in so far as they are accepted, will be a sufficient incentive to inspectors to do their duty and will also serve to check resignations at the commencement of epidemics and will thus remove the only justification which has been suggested for the allowance now granted in towns and preventive circles on the out-break of plague (*vide* paragraph 17 above). (*d*) A hill allowance of one-third of the pay of the appointment (in addition to a pony allowance for rural tracts) is recommended by the Ootacamund Conference and seems to me a just claim, without drawing any distinction between rural and urban circles. This will moreover tend to simplicity. The question is discussed in G.Os., No. 791 P., dated 30th May 1904, and No. 815 P., dated 3rd June 1904. Such an allowance seems called for in regard to all tracts where special rates of pay or travelling allowance are allowed under the provisions of the Civil Service Regulations. The rates of pay and allowances

Margin notes: **special plague allowance.** (beside "(c) There is a very general opinion…"); **hill allowance.** (beside "(d) A hill allowance…")

recommended above would be wholly irrespective of the question whether the inspector formed a part of the permanent special department or not, except that even a temporary inspector, if eventually promoted in the special department, would draw the pay which would be drawn by a certificated inspector. Thus, an inspector whose work lies in a rural circle would get Rs. 50 or Rs. 55 on the plains and Rs. 61–10–8 or Rs. 68–5–4 on the hills. An inspector whose work lies in an urban circle would get Rs. 35 or Rs. 40 on the plains and Rs. 46–10–8 or Rupees 53–5–4 on the hills. The pay of a divisional inspector in a town would be exactly the same as that of a certificated sanitary inspector in rural tracts. An inspector in rural tracts on the West Coast would get Rs. 40 or Rs. 45 and would not be required to keep a pony or bicycle like other rural Inspectors. I have tabulated the proposed rates in Appendix VII. I would not recommend the introduction of these rates of pay, until orders have been passed in regard to the suggested special department and the other proposals for the improvement of the prospects of the staff, nor, in any case, until the 1st April 1905, *i.e.*, until the next season of quiescence. I do not think that the present staff (or any staff) is *worth* more pay than that which I have proposed, but, should the rates of pay be reduced without any corresponding concessions, a large number of resignations must be expected. In any case, a certain number of inspectors may be expected to resign, and large drafts may have to be made on the Revenue, Police and (possibly) Medical departments to fill their places. On the other hand, the reduction of the temporary staff (to make room for permanent employés) might be very advantageously brought into effect concurrently with the hot-weather reductions; it would seem advisable that a sufficient number of subordinates of the Revenue department, should, if possible, be trained in anticipation of the demand; this is dealt with in paragraph 55 below.

Prospects of the present staff.

42. The poor prospects of the staff are commented on by many officers. The Sanitary Commissioner sums up the case with considerable force, in paragraph 2 of his letter printed in G.O., No. 307 P., dated 11th March 1903, adverting to their lack of prospects of advancement (a taluk gumastah, as he points out, can rise to be a Tahsildar), the fact that they get nothing during their period of training, the fact that their contract is terminable by a month's notice and the dangerous (and, I would add, laborious and unpleasant) nature of their work. He adverts to the fact that, in the course of the preceding three months, five inspectors had died of plague in one district and, in a letter printed in G.O., No. 674 P., dated 2nd May 1904 (alluded to in the last paragraph), he specifically suggests some degree of permanency as the best means of promoting economy and efficiency (*vide* also G.O., No. 1165 P., Mis., dated 5th September 1904). These views meet with general assent at the hands of my witnesses, and it is specifically recommended by many officers that service as a plague inspector should count, for purposes of pension, in the event of the inspector being eventually absorbed in a permanent department; it is also specifically recommended that the age-limit for entering the public service should always be relaxed in such cases and that special tests and other examination rules should also be relaxed, where such a course seemed called for (*vide* the evidence of the Madras, Salem, Coimbatore and Hospet Conferences and that of Mr. Brodie, Mr. Richards, the Rev. Mr. Chamberlain, Major Crawford, Mr. Fotheringham, Mr. Bird and Mr. Krishnamáchári). If the formation of a permanent department cannot be effected, I would, in any case, strongly recommend that concessions on the lines just indicated (and adverted to at the conclusion of paragraph 35 above) be granted and that every encouragement be offered to the better class of inspectors in the way of permanent employment in the Revenue department; at present, Collectors are precluded from making use of this method of encouraging the staff by the rigidity of the rules on the subject. I admit that, from the point of view of the Revenue department, such concessions would involve a certain risk; but this would be minimized by the discretion of the local authorities, who, after all, have no strong incentive for saddling themselves with officers who are not likely to do them credit. One or two examples of circle inspectors rising to be Sub-Magistrates would do much to further recruitment. The *expansion* of the subordinate revenue cadre by the recruitment of revenue subordinates for plague work would do a great deal to counteract any just cause for dissatisfaction caused by the admission of outsiders into

Alternative proposal, if creation of a special department is found impracticable.

the higher ranks of the subordinate service, especially if the plague appointments were themselves made permanent in the manner already suggested.

Practical unanimity of opinion as to desirability of employing local men.

43. The desirability of employing local men and men holding a permanent footing in the Government service has been sufficiently indicated in paragraphs 28–33 above. A definite expression of opinion was obtained from most of my witnesses on this point and their assent only varies in degree of emphasis and in the reasons assigned. There is only one dissentient opinion. Mr. Vásudéva Rao observes that local men might be led astray by local sympathies and interests. The possibility is undeniable, but I do not think that the bare possibility is sufficient to outweigh the numerous and undoubted advantages of the scheme; in fact, I am inclined to think that (in a matter, where the good-will of the people makes our task so much easier and the result so much more satisfactory) local sympathies, properly directed and carefully supervised, are rather an advantage than otherwise. In any case, it is fairly clear that, even with the present class of men, sympathy must grow conjointly with that influence and intimacy which are essential to the inspector's power of doing any work at all. Doubtless, if the subordinate plague staff constituted a *detective* department in the strict sense of the word, local sympathies might be inconvenient (though local *knowledge* would be even more essential than it is now), but the assumption of such functions by the staff seems to me impracticable and inexpedient (Part VIII, paragraphs 12 and 35). To quote all the opinions given me as to the advantages of employing permanent subordinates would be tedious, and selection would be difficult; I may advantageously make an exception in the case of Major Birdwood, who has combated plague with conspicuous success in Matigiri and has had excellent means of observing, from an impartial but friendly point of view, our general policy on the borders of the Mysore State. This witness not only gives his opinion decisively on the point at issue in his answers to my questions, but adds spontaneously in a covering letter that he "feels especially strongly "that the plague officials should be of the class of local and permanent officials who "are known and trusted by the people." Some years ago (G.O., No. 878 P., dated 12th June 1899), it was urged that the influence of the revenue inspector must disappear, the moment he was placed on special plague duty, and the Sanitary Commissioner attached weight to this view. No reason was assigned for this statement, and I find myself unable to evolve any argument in its support. I hold the exactly contrary view. If the villager is a stupid man, he will think that the revenue inspector has the same power as before; if he is a clever man, he will know it. I may add that the officer, who originally raised this objection, now observes, in answer to my questions: "If a plague staff is necessary at all, I should "have another hospital assistant or revenue inspector and not a whole-time "plague officer who only frightens people." No other arguments, of which I am aware, have been advanced against the eligibility or utility of revenue subordinates as plague officers. I feel no doubt whatever that the appointment of revenue subordinates of ability, and especially of revenue inspectors (*vide* Mr. Graham's evidence), would, if practicable, be, in every way, desirable. The "shelving" of *unsatisfactory* subordinates of any kind in the ranks of the subordinate plague staff would of course be absolutely disastrous.

Employment of the subordinate medical staff.

44. So far as medical subordinates are concerned, Government has recognized the desirability of employing them (partly on economical grounds) and has prescribed such measures as are called for in regard to their discipline. They have also been exempt, up to date, from the necessity for undergoing any special training (G.Os., Nos. 1257 P., dated 4th November 1903, 750 P., dated 18th May 1904 and 757 P., dated 19th May 1904; also paragraph 9 above). They share with revenue subordinates the advantage of status, but they are not as well-known to the people and certainly could not be expected to have the same administrative facility or habit; their decided popularity, as a class, is some set-off to these drawbacks and, still more so, the comparative facility, with which they would be able to diagnose suspicious cases of plague and administer any treatment that might be required. Many officers are especially impressed with the advantages which would be gained by the ability of hospital assistants, in matters of diagnosis and treatment. Mr. Scott, for example, remarks that inspectors frequently report cases as being plague, when they are not so; Captain W. H. Tucker notes the defects of the staff in

diagnosis, and the same thing was emphasised in Bellary and Adóni. Whilst fully conceding the advantages which would accrue from this, I must observe that this accomplishment, as pointed out by the Sanitary Commissioner, is not without its attendant dangers. Any confusion on the part of the hospital assistant as to whether his function was medical or sanitary or both would be fatal to his efficiency as a plague officer. Diagnosis, in the case of circle inspectors (whatever be the source of their recruitment or the extent of their qualifications), must be strictly confined within the limits laid down by the Plague Inspector's Manual (pages 38–41, 48). On the whole, I am inclined to think that medical subordinates would be far superior to the present staff in point of skill and persuasiveness but not much superior in disciplinary qualities. For hospital assistants of a certain standing, a year or so of plague work would, I should be inclined to think, be an admirable training. There is a strong feeling in favour of the appointment of medical subordinates in the districts of Salem, Bellary, the Nilgiris, Cuddapah and Anantapur. Colonel Pemberton and Major Crawford give their views on this point with considerable force and fulness. The appointment of a certain number of hospital assistants would greatly tend to *popularize* our plague policy and they would be quite as *efficient* as our present staff: if men of strong character (rather than especially skilled practitioners) were selected for the post, they would be almost as efficient as revenue subordinates and certainly more popular. On disinfecting duty, I think they would be thrown away (*vide* paragraph 21 above); I would confine them to town or circle duty.

Method of meeting the drain on the subordinate revenue establishment

45. I now come to the last link in the chain of argument indicated at the end of paragraph 40 above. Some of the officers, who are most in favour of the employment of revenue subordinates, admit the difficulty in replacing the vacancies caused in this way. It will be sufficient perhaps to mention Mr. Cowie and Mr. Clegg as expressing these apprehensions. It may also be noticed that, if revenue subordinates are to be employed to any great extent, some sort of compulsion may be necessary. The Sanitary Commissioner has more than once drawn my attention to the fact that he does not at present receive many *volunteers* for training from the subordinate ranks of the Revenue department. This may, however, have something to do with the necessity for going to Madras for training, and moreover the financial position of the revenue subordinates, who wish to join the subordinate plague staff, seems to be at present in a somewhat undefined and unsatisfactory state, and this may account in part for the small number of applications now received. In Coimbatore and Hosúr, difficulties have been experienced in getting revenue subordinates on plague duty the full pay of the appointment, and Mr. Brodie and Mr. Fotheringham have given their views at some length on the injustice of allowing permanent revenue subordinates less pay than outsiders. My sympathies are entirely with their views: I note that this difficulty appears to have been successfully met in North Arcot, where revenue subordinates are being somewhat extensively employed on plague duty; they take leave and then obtain employment on the plague staff and appear thereby to have evaded the operation of the account rules in question, inasmuch as they are now drawing the full pay of their appointments. Whether this is formally correct procedure or not, I do not know. In any case, it does not make it any easier for Collectors to fill the vacancies caused by their deputation and, in the Ceded Districts, this difficulty is felt especially keenly, it being very difficult, even as matters stand, to get a sufficient number of qualified clerks to fill the regular revenue posts. I think that, if a fair proportion of the posts in the subordinate plague staff are to be filled by revenue subordinates, Collectors will have to assist one another (as they are always willing to do), districts where there are few qualified subordinates indenting on districts in which there are a large number of unemployed matriculates; Kurnool and Tanjore may be taken as extreme examples of each class of district; I do not say, for a moment, that this would do more than *lessen* the difficulties of the situation. So far as medical subordinates are concerned, the difficulties are far more serious. The Surgeon-General has informed me (unofficially) that, even now, plague work constitutes a serious drain on the subordinate medical staff, and it has to be noted that no department could possibly be more inelastic, as it takes a minimum of four years (and generally more) to train a hospital assistant: out of this difficulty in

and on the subordinate medical establishment.

the way of the employment of medical subordinates on plague duty I can see only one method of escape at present. One or more hospital assistants are employed in all towns of reasonable size as passport-examining officers. They are usually raw untrained hands and do their work in a most inefficient and mechanical way (Part VIII, paragraph 27). Their employment causes considerable embarrassment to the Medical department, as they are put on this duty before they have had time to learn their own proper work or get into the routine of their duties. What they have to do could be done equally well by Revenue, Local or Municipal clerical subordinates on the same salary (Rs. 25). The pay and position of such subordinates would then be something like that which I have proposed for passport-issuing clerks (*vide* Part VIII, paragraph 19), and it appears to me that the duties of these two classes of officers demand about the same level of intellectual and moral qualities. The difficulty is that such subordinates might not always be able to judge of the passportee's state of health. If, having regard to the fact that passport-examination is always conducted at or near the local hospital or dispensary, it were decided that the local hospital assistant should always be *at hand* during passport-examining hours and should be ready, *if called upon*, to medically examine passportees, this might sufficiently meet the difficulty caused by employing clerks in passport-examining offices, in which case 30 hospital assistants (now on passport duty) could be set free for ordinary medical work. A corresponding number might then be indented on for deputation as circle inspectors. Convenient as this would be in many respects, there is of course the danger that the presence of a non-medical officer to examine passportees might be made an excuse, if cases of sickness amongst passportees passed unnoticed. This, however, is a risk which is even now accepted as regards circle inspectors. Clerks employed on this duty should go through the course of training suggested for an assistant inspector (paragraph 39 above). If my suggestions were adopted, section 2 (2) of the Plague Regulations would require modification. The Adóni Conference recommend that only *third-grade* hospital assistants be deputed as circle inspectors. I agree with this view. The raw, untrained and untested fourth-grade hospital assistants are wholly unfit even for the comparatively simple duties of a passport officer, and moreover I feel sure that the appointment of comparatively experienced medical subordinates would be in accordance with the views of the Surgeon-General. I would give them a salary of Rs. 40 *plus* Rs. 15 (like certificated inspectors) and also a special allowance of Rs. 10 (called plague allowance, under the present rulings). This might not be a very attractive pay for the hospital assistants themselves, but it is not *necessary*, I submit, that they should be given any voice in the matter, if their appointment be deemed expedient. It would be only made compulsory for a period of two years at most (*vide* paragraph 37 above). I am not sure whether Government would deem it expedient that hospital assistants should be entertained as plague inspectors on a pay of Rs. 10 more than the ordinary sanitary inspector. On this point, I submit that, just as a six months' training is held to give the certificated inspector a claim to higher pay, so a highly specialised training of four years may well be held to entitle the hospital assistants to increased pay, as compared with the certificated men. Further, it is to be observed that, in their case, the alternative is, not loss of employment, but comparatively easy and sedentary work with a chance of private practice. Taking all these circumstances together, I am not sure that their remuneration has been fixed at a quite high enough figure, but economy has to be studied in every detail of the plague administration, and no doubt the Medical department will be willing to take its share of the sacrifices which are necessary to promote this object, as well as the Revenue department. The appointment of fourth-grade men has commended itself to Government as specially economical, but I fear that such an arrangement would not make for efficiency, as explained above. Should Government be pleased to take a favourable view of my suggestion that a proportion of hospital assistants should be employed on observation duty, I would respectfully suggest that the Surgeon-General be addressed in regard to the various doubtful points which I have just indicated. The Surgeon-General has been kind enough to give me his advice on more than one occasion and I have endeavoured to bring my recommendations, as far as possible, into line with his views.

46. Summing up the chief conclusions arrived at in the last 18 paragraphs, I find that the subordinate plague staff is inefficient and overpaid. For this state of things, I find only two remedies which strike at the root of the difficulty, namely (1) to improve the prospects of those members of the existing plague staff whom it is considered desirable to retain, (2) in every way to encourage (and even, if necessary, insist on) recruitment from the ranks of the permanent services. This can to some extent be effected by making service as a sanitary inspector, if especially creditable, a stepping stone to inclusion in permanent Government service: if with this inducement be combined the formation of a pensionable special department, in which a proportion of the plague staff can be absorbed, it will, I think, be found still more practicable to combine increased economy with increased efficiency. Under such conditions, there will, I think, be no serious difficulty in recruiting the plague staff from the ranks of the subordinate revenue service, though I cannot profess to be equally certain as regards the subordinate medical service. Though the present pay of the subordinate plague staff is far too high for their work and qualifications, the temporary and disagreeable nature of the work has to be taken into consideration; even now, there seems to be great difficulty in getting men for the post, except of the lowest rank and qualifications (*vide* paragraph 30 above), and it would be necessary to be prepared for the possibility of something like a general strike, if reduction of pay were made without any corresponding concessions being granted. Such a catastrophe might necessitate a sudden recourse to the ranks of the subordinate revenue establishments, in order to fill gaps and save the whole system from a sudden break-down. It, therefore, appears that, from whatever point of view the subject be approached, our hope of improvement (whether in the direction of efficiency or economy) largely depends on the elasticity of the Revenue department in the immediate future, though I hope that assistance may also be obtained from the ranks of the subordinate medical service. I fear that the conditions of the problem render it impossible to arrive at any more definite conclusions than those indicated in this paragraph. In concluding this aspect of the subject, I can only submit once again that, even as matters stand, our system has produced surprisingly good results, considering the materials by the aid of which the work is accomplished and the extraneous difficulties caused by the fact that the policy adopted by this Presidency has been abandoned (or never adopted) in other parts of India. The necessity for caution in tampering with such a system, the importance of seeing that any change of policy is, as far as possible, reconstructive as well as destructive and finally the desirability of not recommending any change without a full and minute discussion of all the difficulties involved must plead as my excuse for the inordinate length at which I have submitted my views and the arguments and evidence on which they rest. Summary.

47. I now come to the consideration of the training that the subordinate plague staff should undergo, before they are drafted to their work. Certificated sanitary inspectors have, for the last ten years, been undergoing a training of six months in general sanitation, etc. With *their* training I have no concern. Temporary sanitary inspectors have, since 1898, undergone a twelve days' training (*vide* paragraph 2 above) under the superintendence of the Sanitary Commissioner, who has kindly favoured me with a letter on the subject from Assistant Surgeon Bartley (Personal Assistant to the Sanitary Commissioner), printed in Appendix VII, and also with a syllabus and a set of examination papers (now submitted separately to Government). Up to 1902, temporary sanitary inspectors were being trained personally by the Sanitary Commissioner; since that time, this duty has, been delegated to his Personal Assistant, the Sanitary Commissioner himself setting the examination and examining the papers. These men constitute the majority of what may be called the private soldiers in the battle against infection and are fairly entitled, as a class, to their share of the credit for the results achieved, but that they are a far from satisfactory body of men seems to follow irresistibly from the evidence adduced in this chapter. The system appears to me to have broken down completely, so far as the "Assistant Inspector" grade is concerned, and I have already submitted my reasons for thinking that, if matters are to remain as they are in other respects, the method of recruitment for this grade should be put on a wider basis (paragraph 39 above), local men being, in my opinion, likely to Training necessary for subordinate plague staff.

prove of more use than the class of "Assistant Inspectors" now employed in towns. If the system of training suggested below be approved, the training of assistant inspectors might form part of the training to be given by the District Medical Officer or might be separately conducted by any other plague officer, assistant plague officer or supervisor. This might well be left to the discretion of the Collector.

Each district to have its own training centre, when indigenously affected.

48. The Sanitary Commissioner has recently proposed (*vide* G.O., No. 674 P., dated 2nd May 1904) that for the present system of training at Madras be substituted a system of training centres, at each of which the District Medical Officer should be required to give a course of lectures to candidates, certain text-books being prescribed and the examination papers being set and the papers examined by the Professor of Hygiene. These latter conditions are added, with a view to make the instructions conform, as far as possible, to an uniform pattern, a matter on which the Sanitary Commissioner lays great stress and the importance of which I fully realize. The suggestion, as a whole, seems to be based on the recognition of a principle, which the present chapter has been an endeavour to illustrate and enforce, namely the extreme desirability of giving the subordinate plague staff the status and interest of other district subordinates and of endeavouring in every way to weld them into the local administration. It will also, as it seems to me, effect another most important improvement in the training, namely that of making it more practical. Training of a rough and ready nature (and, in twelve days, anything more than this is out of the question) should, in every possible respect, reproduce the actual conditions of the work to be subsequently exacted from the candidate. Now, training in the district in which the candidate is to be eventually employed will reproduce the *local conditions*, the *administrative conditions* and (in plague districts) the *real conditions* of risk, infectibility, etc., which cannot, under the present system, be brought home to the candidate, during his course of training, unless he is possessed of considerable power of imagination (*vide* the evidence of the Hon'ble Mr. Andrew: as to the value of *practical* training, *vide* the evidence of Captain Gabbett, amongst others). Further, the present system of a single central school of training causes administrative inconvenience to the various districts and, coupled with the "accounts" difficulties adverted to in paragraph 45 above, partly accounts for the fact that comparatively few local men (and especially men with permanent posts in the Government service) have been trained. Nothing, as I have endeavoured to show in the course of this chapter, has had a more hampering effect on the success of the administration than the lack of prestige and local knowledge (coupled with the very variable physical, mental and moral attainments) which has characterized the bulk of the subordinate plague staff up to date.

49. I, therefore, on all grounds, welcome the Sanitary Commissioner's scheme for local training and would be inclined to recommend an even more extended application of the principles underlying the suggestion. It seems to me that it would be in every way the most convenient arrangement that, as far as possible, each district should conduct its own training, and there seems no sufficient reason why this should not be done in the case of every plague-infected district; so far as non-infected districts are concerned, the number of candidates would, as a rule, hardly be sufficient to form a class of a reasonable size; besides, wherever it is possible, candidates should have the advantage of seeing and dealing with actual cases of infection and not with artificially arranged conditions simulating those of plague; otherwise, one of the greatest defects of the present system would remain uncured. I would, therefore, suggest that all the nine indigenously affected districts should undertake their own training. In addition, however, I would make three of these districts centres: Coimbatore, a centre for Malabar, Trichinopoly, Madura and Tinnevelly; Vellore (North Arcot), a centre for South Arcot, Chingleput, Madras and Nellore; Kurnool, a centre for Guntúr and Kistna; Waltair would be a suitable centre for the training of the three northern districts.

Syllabus of training.

50. The syllabus is an essentially technical question and one which I touch on with considerable hesitation. The Sanitary Commissioner proposes a course of 30 lectures: I fail to see myself why the training now given should be extended, so

far as *theory* is concerned. It is quite hopeless to expect to make theoretical sanitarians in a fortnight or a month or two months, and to make the attempt is, in my respectful opinion, to court failure and to unhinge the district administration (and especially the ordinary work of the District Medical Officer) to no purpose. Moreover, any increase in the length of the course is a fresh deterrent to candidates who are thinking of entering it. I would, therefore, suggest that the course of lectures to be given by the District Medical Officer be the same as that given now, supplemented by two days' practical disinfection work under the eyes of the District Medical Officer. The number of candidates being comparatively few, the District Medical Officer would be able to give them more individual attention than it is at present possible for them to receive. In addition to this course of theoretical training, each candidate should have a fortnight's practical work under a plague officer (or supervisor, if no plague officer is available), a matter which can be arranged by the Collector. The time chosen for the whole course (which will last about a month) should be between September and February (when there is usually plague in all infected districts), and the candidates should, in their practical course, be made to act exactly like sanitary inspectors on disinfecting or circle duty, except that they should be under the eyes of the plague officer or supervisor, as the case may be, and should be made to perform the necessary operations to a large extent with their own hands, in order that they may be afterwards able to tell coolies, etc., what to do, from their own personal experience. These matters of detail and many others can well be settled partly by the Medical department and to a great extent by the training officers themselves.

51. Colonel King has observed that District Medical Officers who undertook this work would merit a fee per lecture (12 lectures, according to my suggestion). Beyond expressing general concurrence and also suggesting that such a fee might with advantage be graduated in accordance with the number of candidates as well as the number of lectures, I hardly think that I am called upon to report on this point. The same remark applies to the proposed fee to the examining body. I am certainly in favour of there being a central examining authority and also of the use of the Plague Inspector's Manual as a text-book, as suggested by Colonel King. If the principles of that admirable work were followed as well as learnt by heart by the subordinate staff, there would be no room for hostile criticisms of any kind.

Necessary qualifications for candidates.

52. It would be for all Collectors to ensure that wide publicity was given regarding the dates fixed for training candidates and that the names of candidates of approved status, etc., were duly registered. The local authorities may be left to take such steps as they find necessary to *encourage* applications for training. I do not think that any non-official candidate should be admitted to the training, whose general educational qualifications were not such as to allow of his being confirmed as a clerk in the revenue subordinate establishment; he should also be required to produce a certificate of physical fitness from the District Medical Officer; in other respects, I think it should be for the Collector to exercise his discretion in deciding whether the applicant should or should not be enrolled as a candidate, nor would I be inclined to suggest that there should be any right of appeal from the Collector's decision on this point. In Madras, it would seem desirable that similar functions should be exercised by the Sanitary Commissioner or the Deputy Sanitary Commissioner. The former authority is the recognized centre for such applications under existing conditions and, if any fundamental change is made in this respect, it will be liable to lead to confusion.

Successful candidates to be employed in their own districts.

53. After the examination, each Collector should be furnished with a complete list of *all* the candidates who have qualified, with their names, addresses, general qualifications, etc., so that, when he has come to the end of his local list of passed candidates, he may be able to apply to Collectors of neighbouring districts for any of their unemployed reservists who may be available. At the same time, it seems desirable that recruitment should, as far as possible, be made local for each district. I think that the Collector should be bound to appoint all the reservists in his own district, who are *willing* and *able* to serve as inspectors, before indenting on other districts. Further, I think that no recruit should have a claim on an appointment in any district but his own, in preference to any local reservist whom the Collector

may deem fit to appoint. Lastly, I think that it should be the business of every reservist to acquaint Collectors of other districts than his own of his willingness to serve under them; in cases in which a reservist has not submitted an application to that effect, he should have no claim to an appointment in any other district than his own, even as against an applicant who is entirely unqualified. In his own District, he should always have a claim to supersede an unqualified man.

Pay of the appointments.

54. So far as subordinates are concerned, all who undergo the training should, I think, have full pay during the period of their training and also any travelling allowance that they may have earned under the rules, such pay and allowances to be recovered (in the case of their being eventually appointed) from the local body concerned, in the same manner as is done now. As regards non-official recruits, I would make no alterations in regard to the present conditions as to pay and allowances and their eventual recovery from the local bodies concerned. Every possible encouragement should be given (and, no doubt, will be given) to promising subordinates to undertake this training. Their future prospects have been sufficiently dealt with in paragraphs 33 to 38 above. I would suggest that qualified candidates be called reserve inspectors and that, when appointed, they be called special (instead of temporary sanitary) inspectors. The word "Temporary" emphasises the least desirable feature of the appointment, and the term "Special Inspector" is, at any rate, compatible with that connection with the Revenue department, which it seems desirable to indicate in every possible way.

Principle of selection of candidates from the various departments.

55. Collectors may find it difficult, on an entirely voluntary system, to secure a sufficient number of suitable candidates; they may also find it difficult to secure a sufficient number of candidates from the ranks of the subordinate Revenue or Medical departments. In order to remedy this defect, I would suggest that Collectors be empowered, at their discretion, to *insist* on the training of selected revenue subordinates and to refuse promotion to any subordinate who is unwilling to undergo such training, without the necessity for assigning any other reason whatever. Subordinates, who are otherwise qualified to rise to the rank of Sub-Magistrates and who show peculiar promise, should, I think, be selected by preference for training. Selection should, in fact, always be regarded as a compliment to the abilities of the subordinate selected, however little he may appreciate the practical consequence of the preference. Doubtless, such steps *might* be taken under the existing rules, but it seems desirable that the principle just indicated should be formally recognised. For medical subordinates, I do not myself think any special training necessary, though I note that the Sanitary Commissioner is of the contrary opinion; should training be deemed necessary, I think that enough medical subordinates should be trained every year to ensure a continual reserve of at least 30 of them for plague duty. On what principle this can be effected is a matter for the Surgeon-General to decide. The necessity for this will depend on the decision which Government is pleased to arrive at in regard to my recommendations in paragraph 45 above. It is, in my respectful opinion, highly desirable to affirm the *principle of compulsory enlistment for plague work* (apart from that of compulsory training) as binding on all medical and revenue subordinates, if the risk of a possible break-down in the newly-constituted plague department is to be avoided (*vide* paragraphs 35, 37, 45 and 46 above). It will be for the Collector of each district to use his discretion in the application of the principle, in such a way as to balance the claims of the revenue and the plague administrations (for both of which he is responsible) in the best way of which the circumstances admit. There should, I think, be a *minimum* reserve of five trained Government servants (Revenue or Medical or both) in each infected district and of two Government servants in each uninfected district, but I regret that I am not able to claim any authority for these figures; the question is one on which the opinions of district officials might, with advantage, be obtained, if the scheme in other respects commends itself to Government as worthy of consideration.

Advantage of compulsory training of revenue subordinates.

56. I may here enumerate the direct and extraneous advantages of the *compulsory* training of revenue subordinates (and especially those who may rise to be Magistrates): (1) it provides a trained nucleus for filling up gaps in the subordinate plague establishment, (2) it is a valuable training for a subordinate, who may

eventually have to fill the post of an assistant plague officer (paragraph 7 above), (3) it is a training in character and discipline, (4) it is a means of inculcating sound ideas on plague in a class which possesses considerable power of diffusing its views, (5) it will tend to raise the estimate of the work of the plague staff in the eyes of the people and (6) it emphasises the connection between the plague administration and the revenue administration. Many of these arguments apply with equal force to the compulsory training of medical subordinates.

Rationale of the draft scheme.

57. I fear that this draft scheme is susceptible to the criticism that it is either too detailed or not detailed enough; it is, however, an attempt to meet three demands, which have met me in every district, namely the demands for (1) local inspectors, (2) inspectors holding permanent appointments under Government and (3) local and practical training. My system is designed to afford local authorities every opportunity for recruitment of this kind and, at the same time, to afford every possible encouragement to local recruits and especially to Government servants; further, it gives Collectors facilities (so far as they are compatible with the conditions mentioned above) for outside recruitment, when recruits within the district fail; further, it gives a power of forced recruitment, in the case of revenue subordinates, and suggests the conferring of the same power in regard to medical subordinates, powers without which local authorities may, in the last resort, find themselves in a dilemma; that these proposals may *possibly* have the effect of rendering service in the Revenue department less popular than hitherto I admit, but I do not think it likely; no subordinate, who is worthy of rising to the position of a Magistrate, is likely to throw away his chances of promotion by refusing to undergo a month's training; this suggestion is, in any case, quite separable from the remaining portion of my scheme; should Government deem fit, the portion of the scheme which is based on compulsion may be eliminated or modified in such a way as Government may think proper or referred to the local authorities for their opinion. Put in its simplest form, my position is this. Local officers are anxious to employ local men and, primarily, Government servants. This may lead to a deficiency of employés; the local officers may then have to employ compulsion; the persons, in regard to whom compulsion can most suitably be employed, are their own subordinates; the rules which I have framed are merely an attempt to express these principles formally; the principles remain and have to be faced, even if the rules are modified or if no rules are made on the subject. In other respects, my proposals are simply an attempt to define and formalize (with certain modifications in detail) the suggestions of the Sanitary Commissioner contained in paragraph 48 above.

Opinions and suggestions of witnesses.

58. The statement of objects and reasons contained in the paragraph just quoted is a paraphrase of the opinions of the overwhelming majority of my witnesses. A few officers, however, while denouncing the present system of training, raise the objection to the proposed scheme that there might be a diversity in the training. I have followed the precautions suggested by Colonel King for avoiding this. I admit that the personal equation cannot be wholly eliminated or ignored, but it must be noted that Colonel King has not found it possible to train the candidates himself during the last two years. There will, I think, be little risk in substituting training by a District Medical Officer in a plague-infected district for training by the Sanitary Commissioner's Personal Assistant in a locality which happily is not at present infected with plague. Others observe that the District Medical Officer might not have sufficient time for this work, with reference to his ordinary duties. I do not know what functions now fulfilled by the District Medical and Sanitary Officer should be considered more important than the adequate training of a staff to combat plague. According to the scheme which I have submitted, the training would last less than a fortnight, so far as the District Medical Officer's portion was concerned; training would take place once or (at most) twice a year; I do not think that the inconveniences would be so considerable as to wreck my proposal, and every District Medical Officer consulted, with one exception, has expressed himself willing and able to undertake the work. Other witnesses suggest a longer course with the Sanitary Commissioner. This would not supply the practical element, which all admit to be what is really essential; it would not be an assistance to local recruitment, which everybody desires; it would make the course

approach in length and difficulty more nearly to that of a certificated sanitary inspector, without giving the candidate the advantages gained by undergoing the certificated course; the recruitment would be fairly certain to fall to an even lower ebb than it has reached at present, if candidates were made to undergo a course of two or three months at their own expense; would local bodies be ready to grant them their pay for the whole of that period, if they eventually passed? I am inclined to agree with the Madras Conference (whose views are quoted in paragraph 26 above) and with Mr. Carr, who observes of the kind of training required "*After* "*all, it is very simple.*" To put the matter shortly, we can have the scientific sanitarians (certificated inspectors) or the practical workers (special or temporary inspectors), but it seems useless to try and create a species of hybrid, half way between the two. Others suggest that there should be two courses, one (theoretical) in Madras and the other (practical) in the district. I trust I may not be considered discourteous, if I simply observe that such a method would, in my opinion, combine almost all the disadvantages of the present system with a good many more that are peculiar to itself. No other objections have been raised to the proposal. The arguments in its favour are dealt with by many officers; the Hon'ble Mr. Andrew, Colonel Pemberton and Mr. Noyce have expressed their views especially fully on the subject. I may add that I see no practicable alternative or compromise between the continuance of the present system of training and the adoption of a scheme identical with or devised on similar lines to the one just sketched out by me or the abandonment of formal training altogether. I feel bound to add that, if all formal training of any kind were abandoned, I am not very certain that the temporary staff would really lose much by comparison with the existing state of things, except, perhaps, a sense of the seriousness of their mission (usually somewhat short-lived). Mr. Wait observes that "inspectors fresh from training, who have done no actual plague work, require "to be trained and shown their work." This seems inevitable, when the training is conducted in a place which is uninfected by plague. On the other hand, it seems obvious that it needs a man of more brains than the average candidate for plague training possesses to really grasp anything of the *theory* of plague in ten days or even ten weeks. I cannot help thinking that Assistant Surgeon Bartley's insistence on the fact that the fourth question in the examination papers prescribed for temporary sanitary inspectors (namely that on disinfection) is always the same and always *known* to be the same shows a certain *naiveté*. Mr. Graham remarks that sanitary inspectors seem to know a good deal *by rote*. However, the moral influence of a training of any kind is probably productive of some good effect. I have received a good many more or less strongly-worded opinions regarding the existing arrangements for training, which will be found in the appendix. As the Sanitary Commissioner and the local authorities and myself are all in agreement as to the desirability of training being conducted in the districts for the future, it seems unnecessary for me to analyse the evidence as to a state of things which no one wishes to maintain. In regard to the *supply* of inspectors, the Sanitary Commissioner has been the *deus ex machina* of the plague administration of the Presidency for the last five years. The time seems now to have come when it is desirable for districts to rely to a great extent on their own resources, as they already have to do in regard to the subordinate staff of all other Government departments. The present chapter has been, substantially, an endeavour to put this policy of decentralization on as strong a basis as the circumstances permit.

Necessity for European or Eurasian supervision over the staff.

59. Before closing this chapter, a few words are necessary regarding the higher plague officials. The absolute necessity for European supervision by preference and, so far as that is not attainable, for Eurasian supervision is insisted on by many witnesses and by none with more emphasis than by non-officials (*vide* the evidence of Father Rondy, the Rev. Mr. Chamberlain, Mr. G. A. French, Mr. Lobo, Mr. Dughard, the late Mr. Annaswámi Mudaliyár and the Secretaries of the Vellore and Adóni Municipalities). An energetic Special Plague Officer to every two taluks (or, when a taluk is large or deeply infected, a Special Plague Officer to every taluk) backed up by supervisors, recruited in the manner described in the Plague Inspector's Manual (*vide* paragraph 8 above), is the ideal arrangement for getting the maximum value out of the subordinate staff. There are many references to the desirability of the *immediate* deputation of a special officer for plague duty, when plague breaks out

The opinion of the Coimbatore and Kurnool Conferences may be taken as typical of the general feeling in this matter. There are few posts that demand higher administrative gifts than that of a Special Plague Officer, a consideration which considerably narrows the field for selection.

The supervisor class: recruitment and pay.

60. So far as the class of supervisors is concerned, no fundamental change seems called for in the principle of their recruitment or in their pay. The general opinion is that the present pay is the minimum for which men of sufficient superiority and powers of discipline can be obtained. Europeans or Eurasians are unquestionably preferable, but *smart* officers (whether Europeans, Eurasians, Hindus or Muhammadans), chosen from any of the public departments, have been found to do excellent work as supervisors, especially if there is a Special Plague Officer (*with no other work to do*) to superintend their operations. The inconveniences arising from a Special Plague Officer having other duties to attend to are emphasised by Mr. Richards, Major Ffrench and others. Supervisors are a respectable and intelligent body of men. Seven of my witnesses were supervisors and their views have been of considerable assistance to me. That an inspector should *occasionally* be promoted to the rank of supervisor is desirable as an encouragement to good work, but I cannot recommend that such promotions be made usual or regarded as a matter of routine, nor do any of my witnesses recommend any change of the kind. As Mr. Krishnamáchári remarks, what is wanted is power of organisation more than sanitary knowledge (*vide* also Mr. Graham's evidence). I regret to find that my views on the point are in opposition to those of the Sanitary Commissioner (G.O., No. 674 P., dated 2nd May 1904); the matter seems to me to be one of vital importance and, anxious as I am to improve in all possible ways the position of the subordinate plague staff, I am of opinion that to fill the grade of supervisors exclusively (or, even, generally) from their ranks would be absolutely fatal to plague organisation. I may add that, in the grade of supervisors, as in all other grades, deputation to plague duty should never be allowed to be considered a punishment, but rather a means of enabling an exceptionally capable man to show his metal, under promise of substantial recognition if he succeeds in the work. "Failures" should *never* be deputed to plague duty. I am unable to support Mr. Richards' suggestion as to the replacement of supervisors by assistant plague officers; it may be noted that Mr. Clegg prefers the existing organisation (*vide* the Salem Conference). It was suggested at the Salem and Bellary Conferences that for the title *Supervisor* be substituted that of *Special Deputy Tahsildar*. I strongly support this suggestion. It will serve to emphasise, in the strongest possible way, the link between the Revenue department and the plague organisation. It also expresses the status of these officers in regard to rank, pay and responsibility, and I may add that it points to a class of officers, who have done and may be expected in the future to continue to do excellent work in that grade, namely Acting Sub-Magistrates and Deputy Tahsildars.

Nomenclature.

Summary.

61. In this chapter, I have dealt with the defects of the subordinate plague staff (as it now exists), in towns (paragraphs 25–27) and in rural tracts (paragraphs 28–32), and have considered such suggestions as have been brought to my notice for the better regulation of their pay (paragraphs 39, 41 and 45), recruitment (paragraphs 35, 37, 40 and 42–46), training (paragraphs 2 and 47–58), discipline (paragraphs 8 and 9), supervision (paragraphs 59 and 60) and prospects (paragraphs 30–38, 40 and 42). I have also endeavoured to see what improvements could be effected in regard to the distribution of their work, in towns (paragraphs 5, 27 and 39) and in rural tracts (paragraphs 5, 6, 12–14 and 20–23). I have also endeavoured to ascertain the conditions under which their numbers could be reduced during the hot weather (paragraphs 4, 10 and 15–23). Other administrative questions have been touched on in paragraphs 7, 8 and 24. I have, at every stage, endeavoured to indicate the special risks attendant on any interference with the existing organisation, whilst at the same time indicating what exact advantages might be expected to ensue from each of the changes proposed. I trust that my summary of the existing difficulties and my analysis of enlightened opinion on these points may be found to be not wholly without value, even if any or all of the remedies proposed should be deemed unnecessary or inappropriate.

PART X.

Miscellaneous Preventive Measures.

Co-operation of the people—Vigilance committees—Education of the people by means of pamphlets and diagrams—Rewards for information of cases of plague (1) to private persons, (2) to unqualified native practitioners—Should native practitioners be instructed in the diagnosis of plague?—Enquiries into cases of suspicious sickness and death: registration of deaths: corpse-inspection—Duties, efficiency and pay of the special plague police.

In the present chapter, I propose to consider a few subjects, which could not be conveniently classified under any other head, namely (1) the extent to which the authorities can and should avail themselves systematically of the help of the people, (2) what attitude should be assumed in regard to unqualified medical practitioners, (3) the inspection of sick persons and corpses and (4) the Plague Police.

Popular attitude regarding plague measures.

2. Though I premised, in Part II, that popularity could not be taken as a criterion by which to judge our policy, I have endeavoured at every stage to estimate popular feeling in regard to each measure that came up for discussion. It has been seen that the people have a decided belief in evacuation and a healthy horror of dead rats. Beyond this point, their attitude has not been such as to hold out any strong hopes of their affording active help to the authorities, though they have offered little resistance to the measures devised for their benefit. Inoculation and plague hospitals they have always regarded with horror and disinfection with indifference verging on dislike. They have an aversion for the subordinate plague staff and a tendency to conceal cases of plague for fear of the personal inconvenience (and possibly oppression) involved in the discovery that their houses are infected (Part IV, paragraphs 4–8, Part V, paragraphs 55–6, Part VI, paragraphs 15, 23 and 25, Part VII, paragraphs 2, 17 and 20 and Part VIII, paragraphs 6 and 7). Many of these feelings are not wholly without rational justification, and I have suggested various modifications in the existing rules and practice, with the object of removing whatever may seem to give just ground for discontent. Popular prejudices, however, usually outlive the causes which led to them, and there is moreover a minimum of inconvenience, which is a necessary accompaniment to plague measures of any kind. Further, there is an element of fatalism in the oriental mind, which tends to make an active fight against epidemic disease seem useless, not to say impious. This attitude is especially characteristic of Muhammadans. Most of even the enlightened members of that community, when they assist the authorities, are led to do so, I suspect, rather by a sense of discipline than by any great confidence in the measures undertaken. The Secretary of the Vellore Municipality is, doubtless, an enthusiast in regard to plague measures, but the Head-quarters Deputy Collector, Kurnool, would take no treatment, if he were attacked by plague, and Captain Aziz Khan (a gentleman who has rendered most valuable services to the authorities in their campaign against plague) expresses his conviction that the disease is a divine visitation, against which it is useless to struggle. This attitude is closely connected with and shades into an attitude of suspicion or scepticism in regard to the measures actually undertaken by the authorities and is also allied to that habit of quietism, which takes as its motto:—"When in doubt, do nothing." The proverbial shrewdness of the natives of this Presidency and their general confidence in the friendliness and good intentions of the heads of the local administration have modified this attitude sufficiently to make a plague policy *possible* but not sufficiently (as shown by the evidence already discussed) to enable the authorities to count very much on the *active* co-operation or help of the people.

Value and functions of Vigilance Committees.

3. Further, if the people are really to be an important factor in administering the Plague Regulations, another element besides good-will is called for, namely the Power of co-operation. As I have pointed out in dealing with the subject of private hospitals (Part VII, paragraph 18), this faculty is singularly wanting. This, I think, chiefly accounts for the fact that Vigilance Committees have seldom been

of much use in this Presidency. They seem to have proved themselves quite ineffectual in Bellary, except in so far as they may have afforded a proof of goodwill on the part of the gentlemen who served on them and formed an useful means of ascertaining which of the plague measures in operation from time to time are most distasteful to the mass of the people. Every shrewd administrator, in dealing with his district, will endeavour, by constant unofficial intercourse with enlightened native gentlemen, to keep his finger on the pulse of popular feeling, but, in the last resort, it is generally found easier to rely on the submission and obedience of the population to official agencies than on the replacement of such agencies by voluntary action in any shape or form. These remarks are intended to explain the reason why I am unable to recommend any systematic attempt to substitute the action of non-official bodies for that of official agencies in dealing with plague. The employment of such agencies might seem at first sight an obvious means of saving money but would, I fear, completely wreck efficiency, and moreover I doubt whether they would be as popular with the people as an official agency under close and constant European supervision. The extensive use of volunteer agencies, in supersession of official agencies, for plague work would, I suspect, have no effect but that of providing an *euthanasia* for our present policy. Their use is placed at the highest level of which the circumstances allow by the Indian Plague Commission (V. 324), and the conclusion arrived at by that authority has forestalled my own. Captain Gabbett has some useful notes on their use, as *supplementing* that of official action.

Educational value of pamphlets and lectures.

4. Mr. Reilly has suggested that "some attempt should be made to educate "the people in the theory of plague preventive measures, so as to get more co-"operation with the authorities," and Mr. Walsh does not "see why a leaf should not "be taken from the missionaries' book." He suggests the use of posters, showing historically some of the commoner ætiological truths in connection with the disease, and is inclined to think that magic lantern lectures in the larger towns might do good. Mr. Reilly suggests that Hospital Assistants and Revenue Inspectors might be used as agents for popularizing and explaining our policy, whilst Mr. Walsh suggests the deputation of a special officer for the purpose. I am decidedly in favour of the distribution of pamphlets (*vide* Part III, paragraph 51). Such pamphlets should include instructions as to the best method of destroying rats and the manner in which they spread infection, the probable infectivity of fleas, etc., the reason why a floor, when cleaned with cow-dung, probably retains infection, the exact advantages of inoculation, the infectivity of grain, the direct influence of insanitary conditions on infection and any other subjects on which instruction might seem desirable (Part V, paragraphs 27, 62, Part VI, paragraphs 23 and 26, Part VII, paragraphs 20, 23, 26–28, and 31–35). The English copy of Captain Gabbett's handbill regarding rats is printed in Appendix VII, as an instance of an attempt to influence popular sentiment in the right direction. Mr. Walsh's idea that the pamphlets should largely rely for their effect on coloured pictorial illustrations seems admirable: it would of course require a man of literary and artistic skill to display the ætiological truths of plague in a form which would attain popularity without sacrificing scientific precision. I am not in favour of anything in the nature of formal lecturing or discussion: "one at a time" is, I think, the soundest rule for ensuring conversions in India: public discussion tends to stir up an atmosphere of argumentation and to lead to nothing but words: my objection would, I think, hold good, even if we were really *sure* of all the ætiological facts in connection with plague, which, as I have endeavoured to indicate at the conclusion of Part VII, is very far from being the case. The campaign in favour of inoculation, undertaken in 1898–99, is the only instance in this Presidency, of which I am aware, of a formal attempt to popularize a branch of the plague policy by means of oral discussions: its success was short-lived and equivocal, and there are, in any case, very few officers in this Presidency who possess sufficient knowledge, dialectical skill and enthusiasm to achieve even the measure of success which attended Colonel Bannerman's efforts. Moreover, any attempt at popularization has its dangers in this country (Part VI, paragraph 17). Mr. Walsh's analogy between the attitude suggested for the authorities and the attitude adopted by the missionary may hold good as regards inoculation, but it is hardly applicable to

the other plague measures now in force, which are in the last resort supported, not by reason, but by authority and the strong arm of the law: I may be mistaken, but I am disposed to think that an appeal to reason will be but coldly received, when it is known that authority is lurking in the back-ground, ready for use, if reason is found not to prevail. The pamphlets, which I have suggested for distribution, should, within their own limits, be as authoritative in form as the measures which they are designed to explain. A relentless working of the passport rules is likely to be still better appreciated and understood: I am glad to be able to claim enlightened non-official support for this last obseravation (*vide* Part VIII, paragraph 8). From the point of view of spreading sound notions in regard to the disease and also of preventing *bonâ fide* failure to report cases of suspicious sickness, it would seem an admirable thing that unqualified "local authorities" (*i.e.*, station-house officers and village officers) in infected districts should undergo a compulsory course of one month's training, on the same lines as the training already suggested for assistant inspectors (Part IX, paragraph 39). It seems curious that, in towns, the duties of a passport examining officer should at present only be entrusted to an Hospital Assistant, whilst in villages no knowledge whatever is required from or imparted to this class of plague authorities. The village officers would be the best possible media for the diffusion of a sound knowledge of plague principles amongst villagers at large.

Advisability of offering rewards for information of concealment of cases to private persons.

5. One method by which the authorities might avail themselves of unofficial aid would be by the offer of rewards to private persons for giving information of concealed cases of plague or suspicious sickness. The offer of rewards is spoken of favourably by the Indian Plague Commission (V. 323, 327). Major Jennings (page 169) thinks that there are advantages in the system, but he adds that the method will seldom lead to the detection of the earliest cases. I was unofficially informed that the system had been used with success in parts of the Mysore State. The Government of India have not expressed themselves strongly in its favour. All the authorities are agreed in deprecating the use of paid spies and informers, and this view has my decided adherence: the body of men, whom such a system would call into existence, would be a worse evil than plague itself. It appeared to me, at first, that the system of granting rewards could be distinguished from and deprived of the dangers attendant on a system of employing informers, and I accordingly invited opinions on the point. On careful consideration of the opinions of the witnesses, I have come to the conclusion that the system of rewards is, as Mr. Xavier puts it, "something like starting a secret service," without the advantages which would be gained by the more thorough-going measure. The offer of a reward for the arrest of an absconding robber or murderer has no disagreeable consequence, except that of causing ill-feeling and uneasiness amongst a gang of criminals: this consequence may be faced with equanimity, as it does no harm to the respectable members of the community, but a system of offering rewards for the discovery of plague cases, if it once became generally effectual, would implant seeds of suspicion and hatred in the breasts of hundreds of harmless villagers, and I feel little doubt that the prestige of the local officials and their powers of persuasion and influence would materially suffer in consequence. Mr. Krishnamáchári has noted on the matter from this point of view. Moreover, the principle, in itself, hardly seems a sound one. The view impressed on villagers has always been that, by giving timely intimation to the authorities, they are doing the best thing they can for themselves: if this is so, to offer rewards for giving information seems illogical, and such an action would be very likely to lead the people to imagine the existence of sinister motives on the part of the Government. Further, the very small number of witnesses who are in favour of the granting of rewards suggest that they should be fixed at 10 rupees or less. Considering the amount of risk run by a villager in giving information, it can hardly be expected that so small a sum would weigh with him: looked at from this point of view, the system points logically to the paying of regular informers as its ultimate development: such informers could, perhaps, by industry and ability, be able to earn a precarious livelihood, but the *chance* informers will not, as a rule, have the opportunity of earning more than one reward *per annum*. Doubtless, enmity and the fear of infection are additional inducements, but these inducements seem even now sufficient to induce

neighbours, fellow-villagers and the inhabitants of neighbouring villages to give occasional information, and most witnesses think that the offer of rewards would simply serve purposes of spite and black-mail, without procuring the authorities any additional information, to speak of, which would be of real use. Captain Cornwall points out that most of the information now received is *anonymous*. In these circumstances, I do not think that any modification in the existing rules or practice is called for, and such is the opinion of the vast majority of the witnesses consulted. It may be further noticed that a system of reward would amount to paying private persons for an action which it is penal for them to omit (*vide* sections 47 and 48 of the Plague Regulations). Mr. Lobo suggests the stricter working of these sections as likely to be more effective than any system of rewards: this view has my concurrence.

6. Native practitioners are a class of persons who might seem to be a natural source of information and assistance, having avowedly considerable influence over the mass of the people. The Indian Plague Commission specially remark on the desirability, if possible, of inducing this class of persons to co-operate with the authorities (V. 322, 327). Very few of my witnesses are, however, in favour of the system of granting rewards or of any other action, so far as they are concerned. The objection that such a course of action would be paying them for performing a legal obligation has been raised by Mr. Wait and Mr. Fotheringham: it is, certainly, just as applicable to them as to private persons and, so far as they are concerned, I think that prosecution for failure to report cases which have come under their notice should be pushed with the utmost severity and with all practicable frequency, whilst I have some doubt of the expediency of such action as regards house-holders, except so far as cases which have occurred in their own houses are concerned. It is urged that rewards might lead to black-mailing, but the most general objection is that such rewards would be useless, because, as soon as it was known that a private practitioner had given information to the authorities, he would lose his practice. Such practitioners are pronounced, almost universally, to be a low and ignorant class of persons, often wholly illiterate, who live by trading on the credulity of the people. Mr. Macleod observes that they frequently claim semi-religious powers. The Adóni Municipal Secretary has tried to obtain their help, but without success. They disappeared at the commencement of the outbreak in Madanapalle. Captain Niblock found that, in the Punjab, they worked against the authorities. Captain Gabbett thinks that something might be made of them, but the general opinion of the Ootacamund Conference was strongly adverse. Mr. Cowie "thinks it would be a mistake to encourage such a low class of the people, by "offering them a reward or recognising them in any other way." The Chairman of the Uravakonda Union has a favourable opinion of them and "would call in a "private doctor, if he were attacked by plague," but why? "Because they are "sympathetic, whereas the Government doctors would at once enforce the Plague "Regulations." This *naive* observation throws a light on the attitude of native doctors and others, in relation to our plague policy. The other members of the Guntakal Conference observe that "when the patient is sick, they always interpret "a case of plague as something else." Mr. Krishnamácharlu of Bellary (himself a private practitioner) has not a word to say in favour of this class of people and thinks no good could be got out of them. Father Rondy, in remarking on the hopelessness of expecting private doctors to retain their practice and help the authorities at the same time, observes that even the priest is frequently not called in to administer the consolations of religion, for fear lest he should give information to the authorities. The only way of enabling unqualified practitioners to assist Government with due regard to their private practice would be by giving the rewards with strict attention to privacy: this would, in effect, be a way of inaugurating that very system of paid informers, which has been condemned by all the authorities, and would also commit Government to the policy of recognising and supporting a set of very undesirable practitioners. I have already deprecated the offer of rewards, on somewhat similar grounds, in the case of village munsifs (Part VIII, paragraph 34). As in their case, I see no objection whatever to recognition (honorific rather than monetary) of services rendered to Government by individual private practitioners:

to native practitioners.

this, however, seems to need no general rules and may safely be left to the discretion of Collectors. I have already alluded to the subject of private practitioners in another connection (Part VII, paragraph 19).

Desirability of instructing them in the diagnosis of plague.

7. One of the questions on which I requested suggestions was as to the desirability of giving unqualified native practitioners some instructions in the diagnosis of plague. In Coimbatore and Cuddapah, this course is thought desirable, but not in Salem. Mr. Pinhey is against the suggestion. Captain Gabbett, Mr. Noyce and Mr. Bardswell are in favour of it; Captain Gabbett and Mr. Noyce add, however, that they ought to know a plague case by this time. My chief idea, in originally making the suggestion, was that unqualified doctors, who really wished to help the authorities, might sometimes make *boná fide* mistakes through lack of skill. There appear, however, to be very few unqualified doctors, who have any wish to help the authorities, and Mr. Ranganátha Mudaliyár seems to think that they know quite as much about the disease as qualified doctors. So far as the few respectable members of this class are concerned, he may be right, in regard to diagnosis and clinical symptoms. It also occurred to me that, if an unqualified practitioner were prosecuted, he might possibly raise the plausible deference that he was ignorant of the nature of the particular symptoms of the case and therefore did not report it as being one of plague. The Plague Commission allude to this point (V. 329). An unqualified doctor could not, however, as Mr. MacIver remarks, be *compelled* to undergo a course in the dignosis of plague and I doubt whether the mere fact that he could have undergone a course in diagnosis could be urged against him in Court, if the question at issue were simply whether he omitted to report a case, *which he knew to be one of plague.* Moreover, section 47, as it stands, does not seem to predicate or require any knowledge on the part of the practitioner. If the case is actually plague and was not duly reported, the elements of the offence seem to be complete: to save himself, therefore, the native doctor must, as the law now stands, report any case which is in the smallest degree suspicious, and this seems no more than can be justly required of him. Judging from the answer given me by one witness, it would seem that the powers conferred by section 47 are not always acted on or even realized. In the circumstances, I see no reason for submitting any special recommendation in regard to District Medical Officers giving instructions in diagnosis to unqualified doctors. These men, as a class, seem, as Mr. Cowie says, not to merit any recognition. Captain Gabbett suggested their being made to keep books: many of them, however, appear to be unable to read or write. Mr. Coleman observes that they frequently sell poisons in large quantities and that some control over them is desirable in this respect. This matter may call for action, but has nothing to do with the subject-matter of my present report. It seems unfortunate that so little use can be made of these persons, as a class, but, in the face of the evidence before me, I do not see my way to making any recommendations on the subject.

Measures in force for discovery of cases.

8. The measures now in force for the discovery of suspicious cases of sickness and death are indicated in Appendix (I) (2) of the Plague Regulations and at pages 33–4 and 72 of the Plague Inspector's Manual. My inspection notes at Vellore, Erode and Ilitorai, as well as the references to the subject in the Kurnool and Guntakal Conferences, show that, in some places at any rate, the extreme importance of these measures is fully realised. It is also clear that the measures actually carried out meet with no active opposition and are not strongly opposed to the current of popular feeling. Sir Patrick Manson (p. 256) speaks of the *compulsory* inspection of corpses as being in force in this country. The remark does not apply to this Presidency, where the practice is in strict accordance with the principles laid down in paragraphs 16–23 of the resolution of the Government of India on the report of the Plague Commission (G.O., No. 878 P., dated 13th August 1900). In cases of suspicious death, the relations know that the case is liable to be treated as one of plague and accordingly proffer the corpse voluntarily for inspection, in order to escape from further inconveniences: with the same object, people will frequently call on the authorities to come and inspect the dead body (Kurnool Conference and the evidence of Mr. Ranganátha Mudaliyár). Muhammadans, however, in the Anantapur district, when the corpse is that of a

Inspection of corpses.

woman, object to its being inspected and prefer to submit to the enforcement of the Plague Regulations (Guntakal Conference); this coheres with the experience of the Indian Plague Commission and some evidence of the same kind comes from Mangalore, but from nowhere else in the Madras Presidency: at Chittoor, I was told of a small riot, of which the immediate *occasion* was an attempted inspection of a corpse, but the real cause of the riot appears to have been extraneous. In towns, a Hospital Assistant usually performs this duty: in rural tracts, it has to be performed by the sanitary staff (*vide* the Inspection notes quoted above). This forms an additional argument in favour of securing Hospital Assistants, as far as possible, for circle duties (Part IX, paragraph 44): such cases, as noted by the Government of India in the resolution quoted above, are very difficult to diagnose (*vide* Major Crawford's evidence). Mr. Slight speaks of corpse inspection as having been very unpopular in Bangalore in his time, but Colonel Benson observes that, when the measure was abolished in Mysore State, people were getting over their aversion to it. So far as the plague-infected districts of this Presidency are concerned, there seems to be no general objection to showing corpses to the authorities. In Chittoor, I was informed that there were objections to corpses being *touched*: I have not heard of this objection being raised elsewhere. My own impression is that a *dead* body, according to Hindu ideas, would not be held to possess any especial sanctity, and the Rev. Mr. Chamberlain is inclined to support my view: the facts seem to point in the same direction. It seems, in these circumstances, unnecessary to review the evidence as to the feelings of the natives of other parts of India on this matter; the members of the Plague Commission differed as to the conclusion which should be drawn from the evidence placed before them on the point (I.P.C.R., V. 324, 329 and 495–502). I would only emphasise the extreme importance of the watching of cases of suspicious sickness and invite attention to the valuable observations made by Captain Gabbett and other witnesses in regard to this method of detecting cases of sickness and death. I may further illustrate this point by an appeal to an experience of my own, while on tour.

9. When at Erode, I was informed of a case of fever, then under observation (*vide* the Notes of Inspection of Erode), the sick person having come from Trichengode in the Salem district: on proceeding to Salem next day, I heard of cases of suspicious sickness having occurred in Trichengode. Neither Erode nor Trichengode had been infected up to that time: this was the preliminary to the infection of Trichengode, and (though I have not been informed officially) I understand that the Erode case turned out to be a case of genuine plague. I may add that this case also seems to illustrate an inevitable disadvantage attending on the separation of plague administration into revenue districts, which do not necessarily mark geographical or ethnological separations: had the *coincidence* of suspicious sickness in Trichengode and Erode been known earlier in Coimbatore or Salem, it would have assisted the authorities in arriving at a correct diagnosis of the cases at once. My having travelled at that time from one district to the other and having thus been able to connect the two cases was of course a matter of pure chance. I am not speaking of the need for communication to adjoining districts of immediate information of cases *formally declared* to be suspicious: this is understood and carried out: what the present case illustrates is the fact that two administrations (as in this case) may each be cognisant of certain isolated facts, the significance of which could only be properly estimated, if they were considered conjointly. From this difficulty, I see no method of escape.

Advisability of compulsory registration of deaths.

10. Captain Gabbett is of opinion that the best means of checking the spread of plague in towns (apart from the destruction of rats) is to be found in an improved system of compulsory registration of deaths and compulsory corpse inspection. Mr. Brodie notes fully and in the same direction. I agree that legislation in regard to the first matter might produce great improvement, not only in regard to plague, but also in regard to other infectious diseases; in this opinion, I follow the views of the Plague Commission (pp. 327–329 and 503) and those of Major Jennings (p. 167). I doubt, however, whether the good effects of any such legislation would be perceptible for the next few years and it is with the immediate future that I am mainly concerned: compulsory corpse inspection does not

commend itself to me, not so much on account of any apprehension that it would arouse much opposition (I doubt if it would), but for another reason emphasised by the Government of India, namely that corpse inspection (whether voluntary or compulsory) throws the burden of proof that the disease is plague on the authorities making the examination. As matters stand, the case can be *assumed* to be one of plague at the discretion of the authorities and necessary steps taken accordingly. The general opinion is, moreover, that the existing system is working satisfactorily. The free use of the assumption that a case which has not been examined is one of plague, with the alternative of corpse-inspection at the discretion of the relations, is the policy which meets with Major Jennings's approval (p. 171). As to Captain Gabbett's view that more stringent measures for the examination of corpses and the registration of deaths might form a substitute for the passport-system, it is possible that this might eventually be the result in towns in which the system had been in force for a long time and had come to be complied with as a matter of routine, though, even then, the remark of the Plague Commission (V. 332) as to the importance of detecting plague cases *at the earliest possible date* is not to be overlooked (*vide* Part III, paragraphs 23–26): but, apart from this, it is quite clear that the system of surveillance over cases of sickness and the inspection of corpses can, as matters stand, be assigned no higher place than that of a *supplement* (however valuable) to the passport-system. As the Commissioners point out, the significance of a particular case of sickness very often lies more in the *history* of the patient than in his actual symptoms: in such cases, it is the passport-system which enables the authorities to trace out the history and thereby interpret the symptoms. Supposing that the Erode case mentioned in the last paragraph had been known to come from an infected area (supposing, for example, that Trichengode had already been notified as infected), it would have at once given the necessary hint to the authorities: how is such information ever to be *systematically* available, in the absence of the passport-system? I am aware that, even with the passport-system in operation, all difficulties are not removed: I have, however, already attempted to refute, in Part VIII, the view that, because the passport-system is imperfect, it is therefore useless: I need not, therefore, add anything further on that head. My conclusion is that no change is called for in the present system. There are two other objections to relying *solely* on surveillance of cases of suspicious sickness and the compulsory inspection of corpses, namely that such measures can be evaded without any great difficulty (*vide* the Kurnool Conference) and that they take no account of mild cases of plague from which the patient eventually recovers.

Plague Police:—their duties and pay:

11. I have been directed, in G.O., No. 949 P., dated 15th July 1904, to report on the duties and remuneration of the Plague Police. Their duties should, I think, be generally limited to the protection of person or property, the maintenance of order and (under definite orders issued to them in compliance with the Plague Regulations) the restraint of persons from entering or leaving definite areas. The following are the duties on which they are generally engaged and which seem to fall within their legitimate province:—(1) Guarding evacuated houses and patrolling evacuated or partly evacuated towns, (2) guarding plague camps, to prevent unauthorised egress or ingress, (3) guarding plague camps, whether occupied or unoccupied, with reference to the safety of the buildings, (4) assisting Railway Inspecting Officers, with the object of keeping order and enforcing obedience to lawful demands, (5) assisting at medical examinations at sea-ports in a similar manner, (6) rendering similar assistance to Divisional, Circle and Disinfecting Inspectors, (7) guarding contacts or sick persons in their houses or in observation sheds, (8) assisting Passport-issuing officers, (9) assisting in the removal of plague patients to hospitals and (10) preventing corpses from being buried without a permit. Their work at frontier stations will come to an end, if, as I have suggested (Part VIII, paragraph 19), such stations are abolished. They are wholly unfitted for the responsibility involved in patrolling remote tracts, almost more so than the ill-paid clerks whom they are supposed to assist. At Guntakal, they were used to hunt up (supposed) defaulters and bring them to the Railway station (*vide* the Notes of my inspection). Colonel Pemberton notes that, amongst other duties, they are used for assisting in the detection of plague cases.

This, perhaps, means no more than that they preserve order, while the Circle Inspector is doing his duties. They should certainly not be allowed, in my opinion, to do any independent detective work, still less to irregularly arrest supposed defaulters, as at Guntakal. I do not find that they are being employed on any other duties than those just indicated. No. 10 does not precisely fall within the scope of their *general* duties suggested by me, but it is a simple task and one which they seem well fitted to carry out. They are sometimes very vaguely distributed and at Erode were used for ordinary work. This is of course absolutely improper (*vide* the Ootacamund and Erode notes). In most other places (*e.g.*, Méttupálaiyam), I found that they were economically and intelligently distributed.

12. As regards the manner of their work, my evidence shows that they are considered fairly satisfactory in Salem and South Canara, but that they work very badly in the other infected districts. Instances in which individual members of the force had been convicted for extortion were given me at the Anantapur and Chittoor Conferences, but their chief faults are venality, slackness and lack of discipline. I solicit reference to my various conferences : a note as to the conduct of the force is appended in all cases. My general conclusions as to their work throughout the infected districts agree with those arrived at by the Inspector-General of Police in relation to the Bellary Force. They seem to be particularly troublesome at Jalarpet (*vide* Dr. Lubeck's evidence), and the Rev. Mr. Chamberlain gives an amusing account of the method adopted by some of the Vellore Force for securing a night's rest, when on guard, without being detected. Captain Cornwall's experiences are given in Part VIII, paragraph 18, and the experiences related at the Vellore Conference are also instructive. Mr. Giri Rao and Mr. Ranganátha Mudaliyár speak of the negligent way in which they watch property in evacuated villages; the same complaint was made in Vellore, and the Head-quarters Deputy Collector, Anantapur, remarks that, if they did this part of their work properly, more than half of the reluctance of wealthy men to leave their houses could be got over (*vide* Part II, paragraph 12). Mr. Gale (of the Madras Railway) speaks of authenticated cases of robbery in evacuated houses, which have come under his notice. The Rev. Mr. Lucas (2nd Bellary Conference) "strongly "deprecates the entrusting of such powers to men of no position and no sense of "responsibility." They seem to be working very badly in Bellary, even subsequent to the date of Mr. Horne's inspection; the energetic and constant supervision of the Special Assistant Superintendent of Police seems just sufficient to keep their work up to the minimum of efficiency: as Mr. Atkinson himself observes, it is difficult to make anything out of a large body of men, who are little better than coolies (Hospet Conference).

Quality of their work: opinions of witnesses.

13. At Kurnool and Guntakal, the employment of Talayaris was suggested, as a substitute for that of the Special Force: this would be impracticable on a large scale and would, in any case, mean that the villagers would have too much of their own way. Mr. Blake and the Adóni Municipal Secretary suggest the employment of Sepoys. It is very unlikely that this would meet with the approval of the Military authorities. It was very generally suggested (*vide* both Bellary Conferences and the evidence of Mr. Macleod, Mr. Brodie, etc.) that a proportion of the Force, at least 10 per cent., should be permanent men. This was the method which occurred to me in the first instance as most likely to secure improvement, but, on careful consideration, I doubt whether such an arrangement would effect a sufficiently decisive change for the better to compensate for the undoubted harm which it would do to the regular Force. There is always a danger of the worst men of the regular Force being selected for the duty (as observed by Mr. Horne), and this would be no improvement on the present state of things. Bellary and Salem are the two districts which need most consideration from a plague point of view. In Bellary, recruitment for the regular Force is particularly difficult, as matters stand, and, in Salem, the present arrangement appears to be working smoothly enough. I am not prepared to recommend any change in the pay of the constables of the special Force: it is hardly suggested by anybody that a small rise in their pay would result in a better class of men being recruited. The Inspector-General of Police has dealt with this point fully in his letter printed in G.O., No. 949-P., dated

Suggested alternatives: talayaris, sepoys, the regular police.

15th July 1904. Several officers (*e.g.*, Mr. Bardswell and Mr. Noyce) have suggested the desirability of a larger and better supervising staff. Mr. Horne has dealt with this matter in his letter quoted above and I agree with his proposals. I think that there should be at least one Head Constable, recruited in one of the ways suggested by Mr. Horne, to every ten constables. The pay suggested for these Head Constables seems adequate: if it is eventually found by experience to be insufficient to attract the right stamp of men, it may have to be raised. In infected districts in which more than [illegible]00 special Police have to be employed, I think that there should be a special Inspector (an European or Eurasian) for every two taluks. It is impossible for the regular Inspectors and Station-house Officers to supervise these men properly, with due regard to their current work (*vide* my Erode Notes of Inspection).

Desirability of putting the Plague Police under the control of the plague authorities.

14. Mr. Brodie, Mr. Rice, Mr. Fotheringham, Dr. Lubeck, Mr. Saldanha, Mr. Krishnamáchári, Mr. Lobo and Mr. Vásudéva Rao have suggested the desirability of the Plague Police being placed under the control of the Plague authorities. The evidence of Dr. Lubeck, Mr. Lobo and Mr. Vásudéva Rao shows clearly that considerable friction and lack of efficiency result from the present arrangement, and the division of authority, which marks the existing method, seems to me to account in a large degree for the lack of discipline which characterizes the force at present. The state of things described in my Erode inspection notes cannot be considered satisfactory and seems attributable to the fact that no one considered himself responsible for the working of the Special Force. In this connection, Mr. Brodie and Mr. Fotheringham suggest that the Special Plague Officer should be made a Special Assistant Superintendent of Police and given disciplinary control over the Special Plague Force. It seems an unquestionable anomaly that complete control (even the power of transfer—*vide* Mr. Swire's evidence and the Anantapur Police rules printed in Appendix VII) should lie with the District Superintendent of Police, though the men have hardly any connection with the Regular Police Force, except in name, and though their duties bring them solely into contact with the plague authorities. The present arrangement seems also to give the District Superintendent of Police a good deal of trouble (*vide* Mr. Fotheringham's evidence). If this alteration could be carried out, consistently with the police administrative rules, I am inclined to think that it would result in a marked improvement in the work of the Plague Police. In any case, the local police authorities should be directed, I think, to treat the views of plague authorities in regard to the Special Force with respect and to deal with complaints promptly and effectually, submitting copies of their orders to the Collectors of their respective districts (*vide* the Coimbatore and Ootacamund Conferences). On the Gold Fields, the discipline and control of the Plague Police lie entirely in the hands of the local Medical Officer, who informed me that the arrangement worked satisfactorily (*vide* the Kolar Conference and Mr. Krishnaswámi Aiyar's evidence). I have carefully considered the arguments advanced by the then Inspector-General of Police, in a letter printed in G.O., No. 2066, dated 19th December 1899: except in so far as they deal with the *legal* status of the members of the Special Force, they seem to be sufficiently met by the experience of the last five years, which I have attempted to summarize above. In these circumstances, the order just quoted seems, in my respectful opinion, to demand reconsideration in the light of the evidence and opinion now brought forward.

PART XI.

VALUE OF PLAGUE MEASURES—CONCLUSION.

IN Part II and at the commencement of part VIII of this report, I affirmed and illustrated the position that the plague measures of the Presidency must be judged as a whole; it is hardly too much to say that the preventive and remedial measures are essential features of the whole policy, in much the same way as hydrogen and oxygen are essential parts of water: the result of combining them is synthetic, rather than cumulative. Had it been otherwise, my task would have been easier, but my conception of the close connection and inter-dependence of the various parts of the subject has led me into tedious minuteness and has also compelled me to disfigure the body of the report with an apparatus of citation and reference, which seems necessary for the sake of clearness but is certainly destructive of any pretensions to elegance. The chief aim of the report is nothing more than the accurate classification and correct appreciation of evidence; every judicial officer, however, will realize that a judgement, in which witnesses, exhibits *and issues* stretch into three figures, must be clumsy, if it is to be reasonably comprehensive.

Justification of the plague policy of this Presidency lies in its general results.

2. If I am correct in my insistence on the solidarity of the plague policy of the Presidency, it seems clear that its justification can be best sought for, not by criticism of this or that detail, but by considering its general results. This can hardly be done by any *direct* method. I have endeavoured to ascertain, by an analysis of the various features of our policy, in what specific points it is defective and in what directions detailed improvement seems practicable and desirable; but, whether my conclusion on any one of these points is correct, it would be impossible, except in rare and unimportant instances, to find out, by establishing any direct connection between the means used and the end achieved. For example, it seems to me that such changes as an improvement in the "personnel" of the subordinate plague staff or the destruction of rats in large towns might be expected to produce excellent results: a "common-sense" critic will go considerably further and contend that almost every detail of the existing policy is ineffectual and inoperative. He will argue that it is only when the disease has claimed its appointed number of victims that it subsides and that it would have subsided in the same way and at the same time, even if no measures at all had been adopted. My critic cannot directly prove his hypotheses, nor can I directly prove mine.

Comparison of results with those in other countries.

3. In support of this or that detailed suggestion, there is no course open but to rely on opinion or on more or less plausible inference from generally admitted facts, and one or other of these methods has, throughout this report, formed the basis of my various criticisms on points of detail, but, for the purpose of estimating the results of the plague policy as a whole, there remains a far more satisfactory method, namely that of direct comparison of results. In so far as this method is applied to foreign countries, the result is at first sight discouraging. An epidemic continues for six months in Sydney and results in 139 cases and 39 deaths, nor does it spread beyond the limits of the town itself. The results in other cities in Australia and Africa are not dissimilar, so far as my statistics enable me to form an opinion on the subject: the methods adopted in this Presidency can show no results that compare with these. That the systematic attention paid to rats in other countries, as compared with India (a matter which I have illustrated in Part V of this report), has probably contributed *in part* to this difference of results must, I think, be admitted; how far our policy is capable of improvement in this particular feature it is for the future to decide; but, in any case, this single point cannot, when taken by itself, afford the basis for a fair or a complete statement of the essential difference between the position of this Presidency and that of an Australian or South African town. That the native of India has less power of resisting diseases in general than races of European descent is notorious; this is a *natural* disadvantage, which cannot be cured and has simply to be recognised; that the

sanitary habits of the native of India are such as to give facility to the spread of the disease has been illustrated in Part III of this report; this is a *social* disadvantage, which has, so far as the immediate future is concerned, to be accepted as constant and inevitable; again, whatever be the value of the policy of this Presidency, Madras stands alone in enforcing it, so far as India is concerned; hence, we are surrounded with continual possibilities of infection and re-infection from every side; Australia and Africa have little more to do than to look to their ports; our whole boundary is suspect; this is a *political* disadvantage, for which the policy of this Presidency cannot in any way be held responsible; I have illustrated this last feature of the case at the commencement of Part VIII. Those, therefore, who would impeach the policy of this Presidency as being barren of results, are not justified in appealing to the examples of Australia and South Africa, without making due allowance for the various natural, social and political disadvantages under which this Presidency labours in its fight against infection, by comparison with the other countries mentioned above.

Comparison with the past.

4. Comparison between the present and the past is more encouraging and is not uninstructive, provided it be remembered that, when general statements cannot be checked by statistics, large allowances must be made for unconscious exaggeration and sometimes, I suspect, for conscious efforts of the imagination, made with a view to heighten the effect of the narration (Manson, 231–3; Jennings, 2–18; I.P.C.R., V, 52–3; P.I.M., 1). I will pass over the generalities, in favour of one definite statement:—"The London Mortality bill, for the week ending September "19th, 1665, records more than 10,000 victims from plague during that week alone "and, owing to the inaccuracies in the bills in those days, it was generally acknow-"ledged that they seldom returned more than two-thirds of the real number." The population of London of that day is given as less than half a million. Taking it that the population of the infected portion of this Presidency is 5 millions (and allowing our measures, for the moment, no credit whatever for restricting the epidemic within that area), it will be instructive to compare the death-rate of mediæval London with our own. Taking Major Jennings's view of the statistics, we must suppose the London death-rate for the week in question to be 15,000. Deaths at a similar rate, scattered over a population of 5 millions, would result in a death-rate of 150,000. The death-rate of this Presidency for the *year* between June 1903 and June 1904 is 15,000. Thus, the mediæval death-rate during a heavy *week* of mortality is shown to have been ten times as great as the deaths for *a year* in the infected area of this Presidency. A simple fact like this will induce even the most cautious critic to give more credence to general statements, such as the account of "the great plague epidemic which spread over the Roman empire in the "sixth century" and "appears to have lasted for over 50 years: according to "Hecker's estimates, Europe must have lost a quarter of her total population, during "the prevalence of the outbreak known as the *Black Death*."

5. Is there any reason why these appalling results should not repeat themselves in modern India? Apart from our plague measures, I can find none whatever; sanitation was no doubt primitive in mediæval Europe; is it less primitive in modern India? Medicine was in an inchoate state in the seventeenth century; witness, the solemn nonsense transcribed by Major Jennings in the portion of his work cited above, but were the doctors of the Sorbonne more ignorant than the quacks, in whom the natives of this country put their trust and whose vagaries I have dwelt upon in Parts III, VII and X of this report? Some enlightened Hindus and Muhammadans are of course thoroughly up to date in their scientific views on plague, as I have good reason to know, Mr. Krishnáswami Aiyar of Mysore, Mr. Krishnamáchári of Mangalore and other native gentlemen having given me material assistance in regard to numerous ætiological questions touched on in the course of this report, but native gentlemen of this type constitute negligible fractions in a population, whose general notions of hygiene and diagnosis carry us back into the dark ages. In two respects, the mediæval European had a considerable advantage over the modern oriental: firstly, by the superiority of his constitution to that of the native of India; secondly, by the absence of railways and other rapid means of communication in mediæval times. This last consideration has been already adverted to in Part VIII. Thus, the comparison with mediæval statistics contains

both an encouragement and a warning. I may add that I have found absolutely no ground for supposing that there are any racial or climatic characteristics, which *in themselves* promise any immunity from plague; in any case, it has been sufficiently proved by experience that plague will flourish under the most diversified climates and atmospheric conditions which this Presidency can afford. The point has been touched on in Part III; here, it is sufficient to remark on the fact that plague has flourished at Ootacamund, Vellore, Mangalore and Madanapalle, in order to make the demonstration complete.

6. The most fruitful comparisons can be made between different parts of India, the elements which go to make up such comparisons being well known and being also similar to one another in their general characteristics. I know of no general circumstances, apart from the actual measures taken by the authorities, which should make the mortality from plague vary in different parts of India, and I venture to predict that no reason for *conspicuous* variations will be found, other than that which I have just indicated. This assertion is not in any way intended as an impeachment of any authority: I would not for a moment commit myself to the assertion that measures, which are found practicable in this Presidency, must therefore necessarily be practicable in other parts of India, but I unhesitatingly submit the proposition that, if a general and conspicuous difference in plague mortality be found to exist between this Presidency and other parts of India, it can only be attributed to the difference between the measures taken in this Presidency for the control of the disease and the measures taken (or not taken) in other parts of India in the same direction. The Indian Plague Commission (pages 50 and 105) give some terrible statistics of mortality in the case of individual towns, villages and house-holds in North India, individual instances being recorded in which villages, in the course of an epidemic of two or three months, have lost 35, 36 and 37 per cent. of their population. Had the deaths throughout the Presidency from June 1903 to June 1904 been concentrated in the single town of Bellary, they would have produced nothing approaching this fearful death-rate. With reference to these figures, the Commissioners strike a note of warning; the passage seems to me to be one of the most impressive in the volume:—"The full measure of the infectivity of plague "has not, we think, been at all fully disclosed in India, inasmuch as, in the over-"whelming majority of cases, measures have been taken either to extinguish the "infection in infected houses or to remove the people from these, the most considera-"ble sources of infection. In exceptional cases, however, when the presence of "plague has been concealed from the authorities, or where plague measures were "suspended owing to heavy rains, and when, consequently, the people have remained "exposed to the unabated force of the infection, plague has had an opportunity of "doing its worst." What its worst may be is no longer as conjectural as in 1899, as the following tables will serve to show:—

Comparison of results in this Presidency with those in other parts of India:

TABLE A.

Deaths from plague	In Bombay City.	In Calcutta City.	In Bengal (excluding Calcutta).	In the Madras Presidency (including the Presidency Town).	In the Punjab.	In the United Provinces.	In the Central Provinces.	In Bombay (excluding the Presidency Town).	In India.
For the week ending—									
6th June 1903.	221	11	30	13	4,874	163	2	525	6,014
13th ,,	226	15	20	14	2,753	62	...	498	3,707
20th ,,	122	31	19	18	1,191	25	...	582	2,084
27th ,,	91	14	13	31	390	7	...	697	1,362
4th July 1903.	82	15	9	57	173	2	2	1,097	1,563
11th ,,	86	15	7	88	118	...	...	1,531	2,087
18th ,,	65	8	21	74	55	1	...	1,752	2,284
25th ,,	74	9	10	98	17	2	...	1,823	2,290
1st Aug. 1903.	98	13	5	101	24	...	...	2,729	3,342
8th ,,	71	9	18	94	8	...	20	2,838	3,613
15th ,,	57	6	...	108	6	...	18	5,511	6,817
22nd ,,	94	12	3	103	8	8	51	5,087	7,158
29th ,,	81	17	11	124	31	3	65	5,447	7,934

Deaths from plague	In Bombay City.	In Calcutta City.	In Bengal (excluding Calcutta).	In the Madras Presidency (including the Presidency Town).	In the Punjab.	In the United Provinces.	In the Central Provinces.	In Bombay (excluding the Presidency Town).	In India.
For the week ending—*cont.*									
5th Sept. 1903.	88	18	18	117	38	9	107	4,753	7,748
12th ,,	64	13	31	160	56	15	162	8,888	13,088
19th ,,	73	27	39	117	83	70	340	9,163	13,996
26th ,,	91	16	46	128	211	80	404	8,866	13,843
3rd Oct. 1903.	79	17	41	146	80	95	1,231	8,873	13,869
10th ,,	56	17	85	185	425	120	1,161	10,897	16,204
17th ,,	64	17	123	231	353	156	1,401	10,389	16,300
24th ,,	69	13	219	234	353	569	1,522	18,068	18,177
31st ,,	52	19	219	204	751	776	1,646	10,938	17,583
7th Nov. 1903.	56	19	242	168	891	936	2,315	10,113	17,036
14th ,,	55	16	469	241	1,021	1,216	2,490	10,292	18,360
21st ,,	47	22	685	264	1,154	1,819	2,051	9,799	18,329
28th ,,	57	21	717	307	1,223	1,917	1,945	8,832	17,617
5th Dec. 1903.	46	14	778	408	1,674	2,252	1,888	7,079	16,437
12th ,,	59	13	845	463	1,541	1,176	1,966	7,342	17,527
19th ,,	57	15	1,039	441	1,066	2,504	1,687	7,585	17,304
26th ,,	65	15	1,377	539	1,049	2,522	1,547	5,661	15,606
2nd Jan. 1904.	98	18	1,277	709	1,459	2,613	1,446	6,638	16,503
9th ,,	169	15	938	740	1,394	3,291	1,574	6,607	17,344
16th ,,	184	12	2,325	875	3,080	3,567	2,388	5,814	21,302
23rd ,,	195	11	1,741	905	2,289	3,959	2,504	6,801	21,103
30th ,,	339	17	2,318	905	3,251	4,914	2,589	6,351	23,202
6th Feb. 1904.	418	50	2,748	751	2,785	5,593	2,260	6,009	24,204
13th ,,	444	45	2,742	949	3,908	5,517	2,120	6,017	25,629
20th ,,	652	75	2,435	962	4,520	5,487	1,954	6,935	26,537
27th ,,	772	120	2,869	766	5,256	6,121	1,955	6,837	27,858
5th March 1904.	964	174	3,305	674	5,550	6,910	2,040	6,523	28,919
12th ,,	925	230	4,386	525	6,431	8,504	2,290	7,285	33,517
19th ,,	849	295	4,797	388	10,174	9,427	2,804	7,844	40,526
26th ,,	931	471	4,109	355	12,594	8,786	2,230	7,391	39,975
2nd April 1904.	1,065	544	4,810	190	19,322	8,610	1,798	5,624	46,181
9th ,,	975	539	3,516	216	23,775	7,641	1,386	6,513	47,759
16th ,,	706	500	1,942	137	26,961	6,197	704	5,422	46,812
23rd ,,	563	440	1,439	83	24,714	4,279	498	3,972	38,748
30th ,,	520	270	1,062	62	33,953	2,965	214	3,246	44,783
7th May 1904.	373	171	572	46	34,685	2,229	133	2,500	41,607
14th ,,	265	134	261	49	30,723	1,303	62	1,776	35,413
21st ,,	208	134	215	51	24,853	1,069	21	1,165	28,219
28th ,,	129	90	200	59	18,086	653	8	860	20,484
Total ...	14,190	4,821	57,146	15,673	321,375	127,140	56,999	305,785	1,015,904
Population ...	776,006	847,796	77,645,614	42,397,522	24,754,737	48,493,879	11,873,029	2[illegible],692,203	294,361,056
Percentage of deaths to population.	1·83	0·57	0·07	0·04	1·29	0·26	0·48	1·24	0·34

TABLE B.

Deaths from all causes.

[From 1st January to 30th April 1904.]

Area.	Population.	Deaths from plague.	Deaths from other causes.	Total deaths.	Percentage of column 5 to column 2.
1	2	3	4	5	6
Bombay City	776,006	6,629	13,595	20,224	2·61
Bombay Presidency (excluding Bombay City) ...	17,783,555	84,687	167,938	252,625	1·42
Calcutta City	847,796	3,812	7,932	11,744	1·38
Bengal Presidency (excluding Calcutta City). ...	73,897,070	53,010	701,213	754,223	1·02
The Punjab	20,330,339	244,594	209,781	454,375	2·23
Madras Presidency	38,209,436	9,262	244,683	253,945	0·67
Central Provinces	9,876,646	33,998	113,132	147,130	1·49
United Provinces of Agra and Oudh	47,691,782	113,680	415,387	529,067	1·11
Madras City	509,346	6	7,367	7,373	1·45

7. These tables speak for themselves, but I will indicate a few of the simple but startling results that can be obtained from table A. Where one person (per head of population) dies of plague in this Presidency, the death-rate in Bombay Presidency is 31, in the Punjab 32 and in Bombay City 46. The deaths from plague throughout this Presidency for the year are very little more than the deaths in Bombay City for the same period. Though the population of this Presidency amounts to more than 14 per cent. of the total population of India, the Presidency only furnishes 1·5 per cent. of the deaths from plague. Had the plague mortality of this Presidency been on a level with that of the rest of India, we should have lost $1\frac{1}{2}$ lakhs of our population from plague in the course of the year; had it been on a level with that of the Punjab or the Bombay Presidency, we should have lost half a million lives in the year, instead of fifteen thousand. The mean death-rate, from plague alone, all over the Punjab is little less than the mean death-rate *from all causes* in Great Britain; in Bombay City, it is a little more; in this Presidency, the death-rate from plague is an inappreciable fraction. In 1899, the Plague Commission (V, 50) calculated the mean death-rate from plague in the Bombay Presidency (the bulk of the area then infected) as ·6 per cent. of the population of that Presidency (·05 per cent. of the whole population of India). They justly observe that, taking India as a whole, such a death-rate as this cannot be held to "seriously affect "the ordinary death-rate". *Now* the figures for all India are seven times as high as in 1899. In the Bombay Presidency, they are twenty times as high as they were in 1899. In the Madras Presidency alone, the percentage *keeps below the computation for the whole of India in 1899*, though in 1899 barely a tenth part of India was affected by the disease. If it be argued that to compare the Madras Presidency with other Presidencies, the whole length and breadth of which are infected, is to institute an unfair method of comparison, I reply that (supposing the fact to be as suggested) the method of comparison is, none the less, absolutely fair; the measures of this Presidency are devised quite as much with a view to prevent the spread of the disease as to check its intensity in infected areas; if it be argued that the immunity hitherto enjoyed by the bulk of this Presidency simply shows that some parts of this Presidency are immune and others not immune *from natural causes*, I can only submit that, in my opinion, this has not been proved and is never likely to be proved, being against the evidence. There would be, I suspect, a singularly easy method of *disproving* it, namely by the simple method of relaxing or abandoning our plague policy; the infection of Coimbatore and the Nilgiris gave a blow to the confidence of those who thought that there was a parallel of latitude, which formed a natural barrier to plague in this Presidency, and theories of natural immunity have not been advanced by any responsible persons whom I have met in the course of my enquiries.

Results obtained from table A.

8. Table B is a table on which I place but scant reliance; the figures have been taken for the only periods of the year for which statistics were immediately available. I would, however, adduce this table in support of two propositions. It serves, in the first place, to show that the higher death-rate from plague results in a higher *general* mortality in other parts of India than in this Presidency; in the second place, it serves to show how insignificant a place the death-rate from plague occupies in relation to the general mortality of this Presidency, as compared with the place which it takes in other parts of India. To indicate the effect of plague on the ordinary death-rate with thoroughness and accuracy would need a comparison of figures for the last 15 or 20 years all over India. All that I have endeavoured to show by the two tables printed in the text is that some cause differentiates the Madras Presidency in the most marked way from the rest of India as regards plague and that its general death-rate compares most favourably with the rest of India; the figures printed above are sufficient to prove these two facts conclusively; what this result can be ascribed to, except the preventive and remedial measures adopted by this Presidency and abandoned or never adopted in other parts of India, I am wholly unable to divine. Statistics, prepared on the lines of table B, stretching back for (say) 20 years (but including birth-rates as well as death-rates) might have interest from an *Imperial* point of view, as showing what the effect of plague mortality has been up to date on the population of the more deeply infected parts of India and what its effect may be expected to be in the future; from the

from table B.

point of view of this Presidency, however, it is clear that the present plague mortality is without significance, so far as its effect on the rate of increase of the population is concerned.

Encouraging results of the plague policy of this Presidency.

9. The saving (potentially) of half a million of lives would seem by itself to be a sufficient justification for the yearly expenditure of a little over a million rupees; but this is by no means all. There was an account in a daily paper of a few weeks back of a village in some infected area in Northern India, in which the people had neglected to harvest their crops, through the demoralization caused by plague. In this Presidency, the self-respect of the people and their instincts of self-preservation have been preserved unimpaired throughout the last five years; the people may have sometimes resented the action of the authorities; but, whether they have wished it or not, the attitude, which they have been compelled to assume, has been exactly what the attitude of men *should* be in the face of hostile nature, an attitude of resolute defiance. There is said to be a percentage of mortality in battles, above which troops cannot be expected to stand fire; some such percentage would appear to have been reached in some parts of India; the newspaper account which I quoted above suggests the description of the epidemic in A.D. 542, which "wrought the most frightful devastations, wherever it reached, depopulating the "towns and *turning the country into a desert*." In the Madras Presidency, the fire has never approached an intensity at which powers of resistance are paralysed and, even if the present measures in their present form were the best weapons available against the enemy, there seems no reason why such a point should ever be reached, regard being had to the experience of the last five years. Let me add, with all due emphasis, that, when I attribute this measure of success to the plague measures enforced by authority, I fully realize that the *possibility* of such measures is largely due to the proverbially good-humoured, peaceable and shrewd character of the people with whom the authorities have to deal, people who, however imperfectly they may have appreciated the reasons for the annoyance to which a plague policy inevitably subjects them, have never entirely abandoned the belief that after all the Sirkar may know more about it than they do themselves and is at any rate acting with the best intentions. The village officers, as a class, have stood by the authorities manfully to the best of their lights and it is well for them and their fellow-villagers that they have done so. It is not for me to speak of the work of Government, Local and Municipal servants in this matter and, throughout this report, I have confined myself to points in which improvement might seem to be called for. Matters in which no improvements suggested themselves have for the most part been passed over without comment; the best eulogy is furnished by the bare statement of the results achieved.

10. The fact that twelve of our districts, our Presidency Town and all of our seaports should have remained for five years free from indigenous plague and that, of the remaining nine districts, only four can be said to be deeply infected (of which, three are in the closest contact with Mysore) speaks volumes for the success of the measures adopted for controlling plague. In saving the ports and principal towns from infection, they have saved foreign trade from annihilation and local trade from stagnation. That this result has been brought about with the minimum of inconvenience to the mercantile community is cheerfully acknowledged by the Chamber of Commerce. The tone in which my non-official witnesses have discussed the plague measures and the inconveniences caused thereby has been marked, in almost every instance, by good humour and moderation, and I have to acknowledge, with gratitude, the numerous and valuable practical suggestions, by which they have evinced a public-spirited desire to improve the *efficiency* of the plague administration. Further, I have had many opportunities, in the course of my tour and in my district work, of noting the relations between the revenue officials and the people. The feelings of the people, especially those of the villagers, are, as a rule, deeply tinged by respect and gratitude. Rioting in connection with plague measures has been of very rare occurrence in this Presidency. However oppressive and unmeaning many of the rules may seem to the bulk of the people, it is clear that they do not for a moment doubt that what is being done is being done

Favourable attitude of the people.

for their good and with the best intentions. The greater the amount of European supervision that can be employed in connection with plague measures, the more these feelings will be fostered.

11. I have been asked by many persons when I think plague will die out in this Presidency. I can find no data whatever, which would justify me (or would even justify an authority on plague) in attempting to answer this question: I would only venture on one prophecy, namely that plague must, apparently, continue to re-infect this Presidency, year after year, so long as its policy remains an exception to that of the rest of India. To guard the Presidency effectually and completely is hopeless. I did not realize how hopeless it was, until Mr. Scott showed me a map, giving the border-line between the Anantapur district and Mysore State; this aspect of the subject has been sufficiently illustrated at the commencement of Part VIII. The result of our measures, however perfect they may be, can only be to *limit* the spread and intensity of the epidemic resulting from the yearly re-importation of plague from outside the Presidency. Perseverance in this direction may be expected to have its reward in the future, as it has had in the past. A campaign against rats, on M. Danysz's lines, if organised in all the bigger towns of India and conducted to a successful termination, would probably have the effect of completely depriving plague of its epidemic character. This matter has been discussed in the last few paragraphs of Part VII. A campaign on the same lines, successfully conducted in the infected districts of this Presidency, would probably reduce the yearly death-rate from plague to an insignificant fraction of what it is now: more than this it seems impossible for the administration of this Presidency to achieve by itself. Even if I am in error as to the *particular* means by which the eradication of the disease could best be effected, it seems to remain equally true that the battle against infection cannot be fought by *any one Presidency* with any prospect of complete success. Whether it would be practicable or desirable that the campaign against plague should be treated (like a scheme of frontier defence) as an *Imperial* question, it is not for me to say. Possibility of wholly radicating plague.

12. A Bellary officer remarks "I am not in a position to make any definite "statement, but I should think that the proportion of cases to the population of the "district must be (in spite of the large staff sanctioned) very little less than in the "Punjab or Bombay, where no staff is maintained." I may note that a large and expensive staff *has* been maintained in the Punjab up to recently, in connection with inoculation. In any case, the same officer deduces from the supposition quoted above the inference that "there is reason to suppose that the money spent "on the staff is in a great measure wasted." This officer will probably be glad to learn that his suppositions and conclusions are not borne out by statistics. The population of the Bellary district may be taken, roughly, at one million. The deaths from plague for the year 1902–1903 were 6,354. The percentage of mortality is therefore ·6354. This death-rate is not quite half the death-rate from plague over the whole of the Punjab and is just over half the death-rate for the rural tracts of the Bombay Presidency (if Bombay City were included, the percentage would be almost exactly half), and this in spite of the fact that the Bellary district forms a political peninsula, surrounded by foreign country, and contains three big towns, which are morally bound to be infected, year after year, whatever precautions be taken by the local authorities. Thus, even the Bellary district (though it is the most unfavourable instance which could possibly be chosen) is sufficient by itself to afford a decisive justification of our plague policy, in regard to the results attained within its own limits. It need hardly be added that the advantages conferred on this Presidency as a whole by the measures of protection adopted in that district are of inestimable value. Mr. T. Krishnamácharlu (a non-official member of the Second Bellary Conference) has drawn special attention to this fact.

13. Before submitting a summary of my recommendations and findings on the points specially adverted to in my order of appointment and of such other points as seem to deserve consideration, I should wish to solicit special attention to the fact that one of my chief advantages, as compared with the administrators of the various infected districts, arises from the fact that I have been enabled to obtain a Annual conferences on plague suggested.

summary of *all* their views. At the same time, I have felt more than once that, if it had been practicable for me to convene a conference comprising representatives of all the various infected districts, such a conference might have been still more fruitful of results. I would respectfully suggest the desirability, if practicable, of some arrangement by which the Surgeon-General, the Sanitary Commissioner and selected representatives of the chief infected districts and of the Presidency town should meet once a year, with the object of discussing and comparing notes on the chief administrative points which called for action or revision in connection with plague. Questions of ætiological interest could also be profitably brought forward and discussed at such meetings. A full statement of the views of such a body and of any definite conclusions they might arrive at could hardly fail to be of interest and value. It would of course be for Government to decide what action it was desirable to take on any recommendations that such a body might submit. To take a concrete (though humble) example, the opinion of such a body on the various suggestions with which this report concludes might very well be found to be of considerable value and would also serve to throw considerable light, from a practical point of view, on the value of the somewhat speculative arguments, by which I have frequently been forced to support my suggestions. The formation of a new Plague department on the lines suggested in this report is a matter on which the opinion of such a council would, I think, have considerable value, especially in regard to matters of detail, vagueness in which so frequently wrecks a scheme, of which the general design and objects may be sound enough. I would also respectfully suggest that the preparation of the yearly plague administration report by some young official of intelligence and experience in plague matters would probably constitute a profitable month's work. A compilation of any facts of ætiological interest brought to light in the various infected districts during the year in question would be an interesting and perhaps valuable feature of such a report.

General summary of the report and summary of the answers to questions on which a report was called for.

14. I now proceed to summarize my conclusions in regard to the specific subjects on which I have been directed to report; they are enumerated, in the form of ten questions, in the opening paragraph of Part I. I shall answer the questions, as far as possible, in the order in which I have dealt with them in the report.

15. *Question* (3).—I have dealt with the subject of recrudescence in the latter portion of Part III. My conclusions are set forth in paragraph 46. The question is a scientific one and has never been authoritatively decided, but I consider the only safe assumption to be that recrudescence is a determining factor in the re-infection of towns and villages, though not the only factor. Recrudescence is modified by chemical disinfection and would be prevented by *perfect* disinfection, but perfection in disinfection is theoretically and practically unattainable, unless it is combined with successful measures for the destruction of rats in the town or village infected.

16. *Question* (4).—Taking disinfection in the most general sense of the word, increased attention seems, in some respects, advisable, principally in the direction of unroofing and of the more drastic treatment of the house and of its effects, in imported and early indigenous cases of plague. My conclusions on these matters are summarized in paragraphs 28–30 and 48 of Part IV. I also think that systematic disinfection of deeply infected villages in the quiescent season is desirable (Part IX, paragraph 19). As observed by the Indian Plague Commission, no scheme of disinfection, which does not include the destruction of rats, can prevent the re-infection of disinfected houses by their agency; recrudescence will, therefore, remain a possibility, in spite of the adoption of the most adequate system of house-disinfection, but there seems reason to believe that recrudescence is materially checked by chemical disinfection, even as at present carried out (Part IV, paragraphs 25–27). It may, I think, be safely held that any improvement in the process is worth a reasonable amount of additional expenditure. This is, I think, especially true of early cases of infection, to which my suggestions are principally directed. Disinfecting work is frequently not well done by the staff, which is probably one of the chief causes which makes for recrudescence (Part IV, paragraphs 9 to 12 and 25 and Part IX, paragraphs 21 to 23); constant supervision is

the only remedy for this; the agency of Europeans (both as special plague officers and as supervisors) is the best; next to that, comes the agency of Eurasians (as supervisors); thirdly, comes the agency of supervisors of any nationality, but selected for the possession of firmness and character and accustomed to the exercise of power and the enforcement of discipline. Men of this kind cannot, as a rule, be found in the ranks of the subordinate plague staff, and the present system of recruitment is, therefore, best, except in special cases. For the name "Super-"visor" the name "Special Deputy Tahsildar" may with advantage be substituted (Part IV, paragraph 11 and Part IX, paragraphs 23, 59 and 60). No officer should ever be deputed to plague duty, because he is a "failure".

17. *Question* (6).—Part IV is taken up with the discussion of the various methods of disinfection brought to my notice. Phenyl (paragraph 15), carbolic acid (paragraph 16) and hydro-carbon (paragraph 18) seem undesirable forms of disinfectants. Sulphuric acid (paragraph 14) has a limited use: the steam disinfector (paragraph 17) and the proposed system of disinfection by a gas-jet (paragraph 21) may prove useful in big towns or where constant European supervision is procurable. On the whole, the use of perchloride of mercury, coupled with the use of boiling water for the disinfection of ordinary cloths, seems to be the most reliable as well as the most usual method of disinfection; the solution might with advantage be raised to a strength of 1 in 500, in dealing with all but pukka built floors (paragraph 22). At the same time, there seems some reason for supposing that chloride of lime and izal may be equally efficacious sterilizing agencies and that they might prove cheaper than perchloride of mercury; but their immediate adoption cannot be recommended, as up to date they have not received sufficient experimental or authoritative support; these matters deserve careful investigation (paragraphs 19, 20 and 43). Cheap pumps and (generally) cheap and simple apparatus and processes are best for up-country use (paragraph 21). Fire is the most perfect form of disinfectant, though not always practicable, having regard to the expense and wholesale destruction involved (paragraphs 23 and 24); complete unroofing has similar advantages and limitations (paragraphs 28 to 30), whilst partial unroofing seems useless (paragraphs 31 and 32); desiccation by the burning of bratties in the Mysore method, though possessing undoubted advantages, cannot be recommended for adoption on a large scale, by comparison with the present methods (paragraphs 33 to 47), but, in early and isolated cases of infection, when combined with use of chemicals, the free use of fire, chemical disinfection and the digging up of floors and rat-runs, it would constitute the most perfect form of local disinfection of which I can conceive; liberal and instant compensation should be resorted to, in cases in which such effective but drastic measures are put in force (paragraph 48). A power to break open locks, conferred on plague officers, would help to make disinfection prompter and more thorough (Part VII, paragraph 36).

18. *Question* (8).—Inoculation is dealt with in Part VI. In paragraph 22, I have summarised my reasons for considering that no further steps are called for in regard to the measures for promoting inoculation, that the matter may be left to the discretion of individual officers (and especially those of the Medical department), that no compulsion (direct or indirect) should be used in the case of either officials or non-officials and that the attitude of the Revenue department in the matter should be one of sympathetic neutrality. Inoculation during the prevalence of epidemics should, I think, be conducted with certain precautions (paragraph 23) and should not confer any privileges under the Plague Regulations (paragraph 29). The period during which relative immunity has been shown to be conferred by inoculation does not extend beyond four months: this, rather than six months, seems therefore to be the period for which the privileges conferred on the inoculated should be allowed to extend (paragraph 24).

19. *Question* (5).—The passport-system is dealt with in Part VIII. In its broad outlines, it seems to require no improvement, being an essential and excellently devised feature of the plague administration of the Presidency (paragraph 6); in detail, an improvement which suggests itself to me is the abolition of frontier stations and passport-issuing offices, except at the gates of uninfected towns; the passport-issuing clerks should also be paid salaries of at least Rs. 25, a

month and should be allowed to insist, when they think fit, on travellers producing a surety, as a guarantee of their having given correct names and addresses (paragraphs 18, 19 and 32); such clerks should be trained in the manner suggested for assistant inspectors (Part IX, paragraph 39); the convenience of those who have to attend passport-examining offices seems to deserve increased consideration (Part VIII, paragraph 20); permanent exemption from the operation of the passport rules may, I think, be granted once for all to respectable Europeans and Eurasians (the fact of their travelling first class by railway being suggested as a sufficient test) (Part VIII, paragraphs 22, 23), to Government or Railway servants holding acting or permanent appointments of Rs. 100 or more (Part VIII, paragraph 21) and also (at the instance of Government) to individually selected native gentlemen of distinction (part VIII, paragraph 22). The exact powers of exemption conferred on the Collector seem to require somewhat stricter definition and more extended application in practice and should be operative throughout the Presidency, with the *possible* exception of the Presidency town (Part VIII, paragraph 24). The kurnam of a village may, with advantage, be made a "local authority" for the purpose of examining passports, in the absence of the village munsif or any other local authority (Part VIII, paragraph 25) and it seems best to recognise formally that the system of passport-examination in a village is of a somewhat rough and ready though practically effective description (paragraph 33); "local authorities" (Plague Regulations, section 2 (2)) in infected districts should be trained in the manner suggested for assistant inspectors (Part X, paragraph 4); the services of village officers, who do good work in connection with passport work or other branches of plague administration, might, with advantage, be formally recognised (Part VIII, paragraph 34). The action of villagers in segregating out-siders from plague-infected areas is fitful, and its official recognition might give rise to legal and administrative difficulties; it is doubtful whether the Plague Inspector's Manual does not already go somewhat too far in that direction (Part VIII, paragraphs 29–31). In towns, the work of hunting up absentees, in connection with the passport-system, is not, as a rule, well done, and it would be as well that the passport-examining officers should have their duties and responsibilities clearly defined and peremptorily exacted (Part VIII, paragraph 27); passport-examining officers need not be hospital assistants, but, if they are clerks, should be trained in the manner suggested for assistant inspectors (Part IX, paragraph 45); Railway Passport-Issuing Officers and the Railway staff should work in conjunction with one another more intelligently than they appear always to do at present (Part VIII, paragraph 25); *telegraphic* intimations might, with advantage, be sent to the destinations of passportees from Railway Inspection Stations situated in uninfected localities (*e.g.*, Erode and Trichinopoly); passports should *always*, as far as possible, be sent *direct* from passport-examining officer to passport-examining officer (paragraph 26). A simplification (or definition) of the rules as to what constitutes a notification of infection seems desirable and the existence of an epizoötic amongst rats should be sufficient ground for such a notification (Part IX, paragraph 24). The "rationale" of this last suggestion will be found in Part V, *passim*.

20. *Question* (7).—The question of a hot-weather establishment is discussed in part IX, paragraphs 10 and 15–23. From whatever point of view the subject is approached, the maintenance of the greater portion of the establishment during the hot weather seems to be desirable (paragraph 16), but the full value of the establishment cannot be obtained nor can the maximum of economy which is compatible with efficiency be arrived at, unless extended discretion be given to the District authorities (paragraph 19). Further, the principle of allowing a Circle Inspector's range to be doubled in the hot weather seems worthy of recognition (paragraph 20) and there should be no rule requiring *Certificated* Sanitary Inspectors to be employed in disinfecting work; a rule in the exactly opposite sense would seem more desirable, if any rule is deemed necessary in the matter (paragraphs 21–23).

21. *Question* (9).—The proper pay of the subordinate plague staff is discussed in paragraphs 39–41 and 45 of Part IX and my recommendations are tabulated in appendix VII.

22. *Question* (1).—Having regard to the results enunciated at the commencement of this chapter and to the general results arrived at in Part VIII (namely

that the circle system is an essential part of the plague organisation of the Presidency), I am bound to report that the work of the staff, looked at as a whole, *does* produce results commensurate with the expenditure involved; in other words, I think that, if the question be looked at wholly apart from details, the result achieved is worth a yearly expenditure of eleven lakhs from the public funds, or even more; at the same time, the work of the circle staff is anything but satisfactory and their pay is out of proportion to their attainments. Their power of finding out cases independently of the village officers is very limited, mainly owing to the fact that, as a class, they are outsiders of low attainments, having no personal influence and no official position or prospects. I can see no *thorough* remedy for this state of things, short of a reconstitution of the staff, with the objects of (1) giving a fair proportion of the staff permanent appointments, (2) enlisting a smaller and selected portion of them into the Revenue department (or, of course, into any other department that is prepared to take them), (3) infusing a fair proportion of the subordinates of the Revenue, Medical and other permanent departments into the staff, voluntarily, as far as possible, compulsorily, if need arises, (4) providing for a local and more practical system of training. My proposals in this respect are discussed in Part IX, from paragraph 25 onwards, to which I solicit reference. Supposing that my proposals as a whole are not found acceptable, I may add that any steps in the direction of improving the prospects of the staff and welding it into the ordinary district administration may be expected to tend in the direction of efficiency, economy and popularity. Whatever conclusions may be arrived at in regard to the rural staff, I think that the grade of assistant inspector may and should be altered, in such a way as to make it open to locally trained men and especially sanitary subordinates of the town under observation (paragraph 39). The principles underlying the constitution of circles, both urban (paragraph 39) and rural (paragraph 13), should, I think, be defined afresh and a reconstitution of circles called for on the lines suggested in the text. A few points in regard to the disciplinary powers of Collectors in regard to the subordinate plague staff seem to need some amendment (paragraphs 8, 9 and 18). I may add that, in my opinion, the main use of the circle staff is not at present as a *detective* agency, nor do I think that it would be practicable or desirable that their work should be judged exclusively from this point of view; their success must always depend, for the most part, on their influence and on their power of moral suasion: even as at present constituted, they do effect *some* detective work and are of even more value as a check on the village officers (Part VIII, paragraphs 12 and 36). Inspectors should not be too largely recruited from the Brahman caste. It is the lower castes, rather than the Brahmans, that need attention, and Brahmans will frequently not care to enter the houses of low-caste persons or to undertake other duties which involve ceremonial pollution (Part IX, paragraph 30).

23. *Question* (10).—The period of segregation for patients recovering from pneumonic plague seems to need extension (Part III, paragraph 18); a system of official and non-official visiting of plague hospitals would be desirable (Part VII, paragraphs 11 and 15) and the type of building now in vogue for such hospitals stands in need of improvement (Part VII, paragraphs 13, 14 and 17). The use of tar and sulphuric acid during epidemics is to be deprecated (Part VII, paragraph 23). A systematic campaign against rats during the hot weather seems desirable, by means of traps or poisons or both; the co-operation of the villagers (and especially of the village officers) and of influential citizens in the big towns should be secured (Part VII, paragraphs 26–28). Grain, before leaving the more important stations in infected areas, should be searched, to see whether it contains dead rats or any other obvious sources of infection (Part VII, paragraph 30); grain arriving by road from infected areas should be disinfected, wherever such a course is found practicable; this is especially desirable in the case of weekly markets (Part VII, paragraphs 31–33). Dr. Danysz's method for the destruction of rats, if found practicable, would probably be the best means of depriving plague of its epidemic character (Part VII, paragraphs 41–44). Stray cats and dogs should be destroyed (Part VII, paragraph 25). Head constables for the special plague police should consist entirely of reliable members of the permanent force or of trustworthy pensioned officers (Part X, paragraph 13); the special police

should be put under the control of the Special Plague Officer, who should, if necessary, be made a Special Assistant Superintendent of Police (part X, paragraph 14). I see no reason to differ from the suggestions of the Inspector-General of Police as to the proper rate of pay for the force; the duties of the force should be restricted within the limits laid down in paragraph 11 of Part X. The policy of evacuating big towns *in blocks* seems to demand reconsideration (Part VII, paragraph 37). The best method of spreading knowledge in plague matters, apart from definite instructions to revenue subordinates, special inspectors, assistant inspectors, passport-issuing officers, passport-examining officers and other "local "authorities", lies in the circulation of illustrated pamphlets (Part X, paragraph 4). Many obscure points in regard to the ætiology of plague demand settlement; this can only be brought about by the encouragement of original research on the lines suggested by Captain Cornwall, Captain Niblock, Dr. Elliott and other officers. Much could be done by the district officers, in the way of collecting facts and evidence (Part VII, paragraph 45). Yearly conferences might be advantageous, from this point of view (paragraph 13 of this chapter).

24. *Question* (2).—The answer to this question is contained in the answers to the questions already answered. How far my suggestions make for economy *in the long run* must depend mainly on the degree in which they tend to check the progress of the disease. As regards their *immediate* financial results, those which involve *increase* of expenditure are:—(*a*) the more drastic treatment of imported and early indigenous cases of plague, (*b*) systematic hot-weather disinfection, (*c*) increased European and Eurasian supervision to such an extent as may be found feasible, with especial regard to the constant supervision of disinfection in rural as well as urban tracts, (*d*) improvements in the construction of plague hospitals, (*e*) more stringent measures in regard to the destruction of rats and the examination and desiccation of grain. The suggestions which involve *reduction* of expenditure are:—(*a*) the abolition of frontier station and (except under special conditions) of passport-issuing offices, (*b*) the re-constitution of observation and preventive circles, (*c*) the organisation of hot-weather establishments by Collectors, within certain limits, in anticipation of sanction and (*d*) a reduction of the allowances now in force for the subordinate plague staff. Whether the revised scheme suggested for the training of plague inspectors would involve an increase or decrease of expenditure is a point on which I hesitate to express a decided opinion.

Government of Madras.

LOCAL AND MUNICIPAL DEPARTMENT.

Recd.	1905.	*Enclosures*
Regd.		*Spare copies*

G.O., No. 1010 P., 15th September 1905.

Report.

Passing orders on the — on Plague Administration in the Madras Presidency, submitted by Mr. J. P. Bedford, I.C.S.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

READ—the following papers:—

G.O., No. 605 P., dated 8th April 1904.

Letter from J. P. Bedford, Esq., I.C.S., Officer on Special duty to inquire into Plague Administration in the Madras Presidency, dated 12th February 1905.

Order—No. 1010 P., dated 15th September 1905.

In G.O., No. 605 P., dated 8th April 1904, Government in reviewing the course of plague in the Madras Presidency observed that ever since August 1898, when plague made its first appearance, there had been a gradual spread of the disease in spite of the best efforts of Government and of their officers, and that a large and costly staff had had to be employed throughout the greater part of the year, the expenditure on which had become an ever increasing burden on Local and Municipal funds. His Excellency the Governor in Council accordingly resolved that the scope of the measures to be taken in the Madras Presidency to combat plague should be reconsidered and that a selected officer of the Indian Civil Service should be placed on special duty in order to carry out a thorough investigation of the many doubtful and disputed points of plague policy and administration. The Special Officer was directed to report, after strict local investigation, on various details of the existing system of plague administration. He had specially to consider if Government were, in practice, getting full value for the expenditure incurred on plague measures, and if any and if so what, economy was possible without impairing the efficiency of those measures. This meant a review of the agencies employed to carry out the plague regulations and the assessing of their total use and value. The reason of the reappearance of plague after it had once disappeared was for consideration according as that bore on proper disinfection or surveillance of suspects. Proper disinfection was itself in question as also the promotion of inoculation. In short, the Special Officer was at liberty to deal with the whole praxis of plague prevention; this necessarily involved some consideration of the ætiology of plague.

2. The officer deputed for the purpose was Mr. J. P. Bedford, I.C.S. In the report now under review, he has dealt with the subjects referred to him after completion of the detailed local enquiry which he was directed to regard as the essential part of his work, and the mass of evidence that he has collected from various officials and non-officials forms an appendix to his report. Mr. Bedford's orders did not include a consideration of the regulations for inward and outward bound vessels, which are based generally on the terms of the Venice Convention; nor had he to deal with the question of observation and detention of passengers and vessels arriving from infected ports.

Government will now proceed to pass orders upon the various questions for decision referred to in the report as summarised in paragraph 1 of Part I.

3. Part III, which deals generally with the ætiology of plague and the three different types of the disease—bubonic, pneumonic and septicaemic—, appears to Government to be a very useful dissertation on the subject. Mr. Bedford's conclusions are based on the reports of previous enquiries and of medical articles, supplemented by his own observations. He is of opinion that in bubonic cases, which form 87·5 per cent. of the whole number, infection is chiefly caused by the entry of the plague bacillus through abrasions in the skin, a fact which proves the value of wearing stockings and boots or shoes. On the other hand it would seem that the infection period of pneumonic plague is longer than in bubonic plague. The chief means by which a patient can communicate infection are enumerated in paragraph 19 of this Part, and Mr. Bedford's conclusions on the theory of recrudescence are set forth in paragraph 46. He considers the only safe assumption to be that recrudescence is a determining factor in the re-infection of towns and villages, but that its action is auxiliary rather than paramount. The origin and cause of recrudescence as apart from actual re-infection from outside sources has never been authoritatively decided and is for investigation by a scientific body such as the Plague Commission. The Sanitary Commissioner (Lieutenant-Colonel King, I.M.S.) expresses the view that when the interval of freedom from epidemic influence has extended to several months, the so-called recrudescence, when not referable to incomplete disinfection, may be due to cases of mild and atypical plague—the offspring of a microbe temporarily attenuated in virulence by seasonal environment—continuing in the human population, and that such recrudescence is rarely brought about *primarily* through the agency of rats or other animals.

4. Part IV of the report deals with the relative value of the various disinfectants. Mr. Bedford concludes that the people will not disinfect for themselves, that disinfecting operations can only be carried on on the basis of compulsion, and that in conducting those operations the necessity for efficient supervision by responsible officers is paramount. He considers that disinfecting apparatus in the mufassal should be cheap and simple, and that costly and complicated apparatus should be confined to places where constant and skilled European supervision is obtainable. As to chemical disinfectants, carbolic acid, sulphuric acid, phenyle and hydro-carbon are not deemed to be of great practical utility. Perchloride of mercury is stated to be the most efficacious, but, with a view to economy, Mr. Bedford recommends that further experiments should be made with izal and chloride of lime which are cheaper than perchloride of mercury and which may prove to be equally effective. Government approve of the recommendation, but desire that these disinfectants should not be actually brought into general use until it is conclusively proved that they are superior to perchloride of mercury. Whatever may be the means of disinfection adopted, the essence of the whole system is that to be effectual it must be perfect and carried out under proper supervision, since imperfection continues the element of danger to the extent to which it falls short of perfection. Mr. Bedford recommends the adoption of the Mysore system of disinfection by the burning of bratties (dried cowdung) to a limited extent, viz., in early and isolated cases of infection and in conjunction with chemical disinfection. Government are not inclined to view the recommendation very favourably. Disinfection by flame which may be fully and uniformly applied to the area to be disinfected is likely to prove of considerable value, and Government have already brought this system to the notice of the Government of India with a view to its further investigation by the Plague Commission (G.O., Mis. No. 788 P., dated 13th July 1905). The digging up of floors in imported and early indigenous cases, if accompanied with disinfection, appears justifiable, but the general adoption of such a measure is likely to be productive of more harm than good. Government are in entire accord with the opinion that partial unroofing of houses with the notion of admitting sunlight is of no value whatever for disinfection purposes and that, wherever possible, especially in cases in which it can afford any harbourage for vermin, the whole roof should be removed.

5. Part V deals with rats and other animals and insects as the means of transmission of plague. It is conclusively proved that rats *do* communicate the disease and convey it from one area to another. The ubiquity of the rats in this country and their proved extreme susceptibility to plague render them the most dangerous carriers of infection. At the same time Government must accept the view expressed by the Sanitary Commissioner that human beings are *ordinarily* the first importers of plague into previously uninfected areas and that rats only exceptionally occupy this position.

Rats are, however, subsequent to its introduction, great disseminators of plague. Mr. Bedford recommends the complete destruction of rats whether in infected or threatened localities as the only course which seems to hold out very strong hopes of the complete eradication of epidemic plague from this Presidency. Government consider that measures for the destruction of rats should be universally adopted; if possible they should be exterminated *before* the arrival of plague, and special precautions as to their destruction should not be confined only to infected or threatened localities and their immediate surroundings. Government are further of opinion that when rat mortality has declared itself in any specific locality and when bacteriological examination has proved the plague bacilli to exist, the area affected by the epizootic should, apart from any ascertained human infection or mortality, be declared to be plague-infected.

Later, in Part VII, the various methods of rat destruction are discussed. The use of tar and sulphuric acid during an epidemic is strongly deprecated by Mr. Bedford (paragraph 23) as tending to disseminate rather than to limit plague. Government concur with the view that these disinfectants are useless for the purpose of destroying rats, but at the same time, subject to certain limitations, they have their uses for the purpose of protecting houses or goods from infection or reinfection, without any serious risk of dissemination by the scattering of rats. The following cases may be cited :—

(*a*) For the protection of houses *at a distance* from an infected area. In this case care must be exercised and the disinfectants should be used only from the circumference of the circle working inwards to the centre of infection.

(*b*) For the protection of individual uninfected houses situated within infected areas of a town.

(*c*) For the prevention of the return of infected rats to houses which have been disinfected.

(*d*) For the protection of jaggery, grain and similar articles which are specially attractive to rats and which themselves retain and convey infection.

Mr. Bedford strongly urges in paragraph 44 that experiments with Danysz' virus on the lines successfully conducted in various foreign countries hold out more hopes of real success in the campaign against plague than any other measure brought to his notice. This, coupled with poisoning, seems to Government to be a most hopeful remedy. The "common sense rat exterminator" has been found in practice to be especially effective as a poison. Hitherto the Danysz' virus has not proved very efficacious in this Presidency, and the Sanitary Commissioner has been making experiments with a view to the production of a stronger culture of the virus suited to climatic conditions, as the samples hitherto used became attenuated in strength during their journey to this country.

6. Part VI deals with inoculation. Mr. Bedford is not very strongly in favour of inoculation as a means of suppressing plague. In paragraph 22 he summarises his reasons for considering that no further steps are called for in regard to the measures for promoting inoculation and that the matter may be left to the discretion of individual officers. He finds that the general attitude of the enlightened portion of the community in the matter is one of indifference and that of the unenlightened one of repulsion. He is not in favour of any extension of privileges now enjoyed by holders of inoculation certificates but, on the other hand, thinks that the period during which the privileges stand good requires curtailment as he finds no reliable evidence to show that the period of immunity extends to any definite time beyond four months. Moreover the immunity from plague temporarily enjoyed by inoculated persons does not extend to their clothing which equally with that of non-inoculated persons is likely to convey plague germs from an infected to a non-infected quarter, and should in the case of contacts be subject to disinfection equally with the clothing of non-inoculated persons. In paragraphs 24 and 29 he accordingly recommends that the privileges now granted to persons inoculated at the time of an epidemic should be rescinded, and that in cases of persons inoculated at other times and places the privileges should extend only to four instead of six months. Government accept this recommendation.

7. Part VII.—The first portion of this chapter deals with plague hospitals and camps. Mr. Bedford proves conclusively from statistics the fallacy of the popular idea that plague hospitals are "death-traps", and while he would not alter the rules of

the Mufassal Regulations in regard to the visits of relatives, he would appoint a special committee of non-official visitors in whom the people have confidence, for each plague hospital or camp. This suggestion commends itself to Government especially so far as large centres of population are concerned, and steps will be taken to give effect to it. Government are unable to accept the proposal that an improved and costlier type of buildings should be adopted for plague camps at the expense of Provincial funds; nor do they find any necessity for accepting the recommendation that the hospital should be built in a series of one-patient wards. In the case of large towns indigenously affected, Mr. Bedford holds that evacuation should, if possible, be complete, and not by blocks, and that evacuation without *complete* disinfection is useless. Hence, for disinfection purposes, it is suggested that plague officers should be empowered to break open locks in order to render disinfection complete. Government have already passed orders on this subject in their Proceedings, No. 322 P., dated 4th March 1905, and the plague regulations will be further amended so as to empower plague officers to deal similarly with locked receptacles inside houses themselves.

8. *Infectivity of grain.*—Mr. Bedford suggests (paragraph 30) that at stations in or in close communication with infected areas, an examination of grain or food stuffs conveyed by rail is desirable with a view to ascertain whether they contain rats dead or alive. Government, while agreeing with Mr. Bedford, observe that the disinfection of grain and food stuffs under transport or going to weekly markets seems to be almost impossible of execution and that, if practicable, they should be dealt with within the actually infected locality. Still, grain in transport should be subject to inspection and treatment when there are sufficient reasons to regard it as infected, but whenever disinfection of grain is held to be necessary, timely notice of the necessity should be given and proper arrangements for effecting it should be made. Government are unable to approve of the suggestion that the holding of markets at infected places should be prohibited, but the site of the markets when inside a town might in some cases be shifted temporarily to a suitable site without town limits. It has been usual only to prohibit the holding, other than locally, of special *fairs* and *festivals*, and, in the opinion of Government, it is impracticable to prohibit entirely the holding of weekly markets from which a large portion of the people obtain their ordinary supplies of food and other necessaries.

9. Part VIII.—This chapter deals with the passport system which is the essence and foundation of plague administration in this Presidency. It is generally accepted that the greatest importance attaches to the earliest possible intimation of the occurrence of a case of plague in hitherto non-infected localities. By the immediate isolation of the patient, the careful observation of contacts, and the disinfection of all clothing and other articles which have been in contact with the patient, or which have been brought by him from infected areas, the outbreak of an epidemic in a new locality may be successfully frustrated. Mr. Bedford is of opinion that, in its broad lines, the passport system needs no improvement, being an essential and excellently devised feature of the plague administration of the Presidency. He holds that the system has amply justified the expenditure incurred on it and that it is a necessary provision in the chain of preventive arrangements for combating plague.

Government are in entire accord with this view and consider the system to be an effective measure of plague prevention and accordingly to be continued both in towns and rural areas. They, however, agree that the establishments of road inspection stations, either at the frontier of other infected States or along main lines of communication, have not justified their existence owing to the easy manner in which they can be evaded and the impossibility of exercising adequate check and control over the action of the passporting officers in charge of the stations. These offices will accordingly be abolished except in the very special cases where, owing to the geographical features of the country, their existence can be fully justified and where the staff can be placed under proper supervision. This prohibition does not apply to passport stations at the entrance to towns, the continuance of which may be necessary in many cases.

Mr. Bedford proposes to relieve the strain on passport examining officers by providing for inspection of persons exempted under note 3 to Rule 2 (3) of the Mufassal Regulations only when or at such intervals as the officer, subject to any orders of a superior authority, may deem necessary. Government accept this proposal.

10. An important suggestion is the extension of the exemption from the passport rules. At present exemptions are granted *personally* only; but the suggestion of Mr. Bedford to grant such exemptions *ex-officio* will now be adopted in the following cases:—

All Government or Railway officers or pensioners on salaries or pensions of Rs. 100 or upwards *per mensem*.

All Deputy Tahsildars.

All Medical Officers.

All Title-holders.

All Special or Honorary Magistrates.

All Members of District Boards.

All Members of Taluk Boards.

All Members of Municipal Councils.

In other cases the Collector will retain power to exempt personally at his discretion. It should be clearly laid down that any misuse of the exemption certificate by any person will entail its summary withdrawal. The certificates granted will remain in force until revoked by the Collector who will be empowered to cancel the certificate at any time without assigning reasons. The special exemption will not cover the clerks and servants of the officer exempted who will be liable to observation under the ordinary rules: nor will the exemption confer any immunity from disinfection of the person and effects of the officer himself when he has been an immediate contact of a plague patient. As regards the recommendation that all certificates granted by the Collector should apply all over the Presidency, it is observed that the suggested arrangement has already been sanctioned under Plague Commissioner's Proceedings, No. 619, dated 4th November 1899, and G.O., No. 246 P., dated 3rd March 1903. This is, however, now formally approved and the necessary provision will be embodied in the Plague Regulations. The suggestion that the Kurnams should be authorised to sign passports in the absence of Village Magistrates or other local authorities has the approval of Government.

It is also suggested that the headman should have the power of dispensing with the attendance of any grantee of a passport if he thinks fit to do so on condition that the headman is held fully responsible for immediately reporting any case of sickness or departure on the part of the grantee. Government consider that village headmen cannot safely be entrusted with such responsibilities, and the proposal must be negatived. They agree with the observation of the Special Officer (paragraph 26) as to the desirability of conveying more rapid intimation as to the arrival at their destination of persons to whom passports have been issued by means of telegraphic communication from railway inspection stations. They also approve of the proposal that, pending notification in the official gazette, a notification by the Collector promulgated by beat of tom-tom in the local area concerned shall be sufficient for declaring any area to be infected, for the purpose of the passport regulations.

11. As to the segregation of contacts, Government are of opinion that more widely extended use may be made of the system of contact-passes after disinfection of the person and the effects of the contacts, in cases in which there are no grounds for reasonable suspicion that the persons so passported will not duly report themselves for observation. The germs of the disease are likely to lurk in the clothing and effects of the contact; but if these are disinfected and daily observation of the contact secured, there is small risk run, if plague is developed, since isolation can be effected before the disease has reached the stage at which it will be immediately infectious and likely to be conveyed to other persons.

12. Part IX dealing with the appointment, discipline, duties, pay and allowances of the observation staff and the area and arrangement of their charges is a most important portion of Mr. Bedford's report.

Taking the latter question first, Government agree that observation circles or ranges of work should not be laid out rigidly on or from maps, with mere reference to areas involved, but by the Collector, from local knowledge based on details of population, villages, difficulties of locomotion, geographical features, and the ability of the circle officer to get round them within a specified time which might be fixed at

seven and ten days according as the areas are or are not indigenously affected. For the detailed arrangement of the circles or ranges, the Collector must be responsible. This principle has already received recognition in G.O., No. 1290 P., dated 6th October 1902, though not formally embodied in the Plague Regulations.

Under existing orders no reduction of staff during the hot weather can be effected until Government have fully considered the proposals of the Collectors concerned in consultation with the Sanitary Commissioner. As such a course occasions delay, Mr. Bedford suggests in paragraph 19 that Collectors should have the power, in anticipation of approval, to reduce the number of inspectors to one half for observation, utilising the whole or part of the staff thus set free for disinfection purposes. Government consider that the difficulty of getting a staff together again and the necessity of a month's notice of discharge are objectionable in their own way and prevent prompt adjustment of staff and work. But, on the whole, Government consider that a fuller exercise of discretion to the Collector may be granted. Separate orders on this point will issue.

13. The Collector must be held responsible for the working of the plague staff of his district, and it is essential, as observed by Mr. Bedford, that he should exercise adequate powers of discipline and control. The present position of Sanitary Inspectors in this respect is anomalous. They are nominated by the Sanitary Commissioner on the application of the Collector, but should the latter find their work unsatisfactory or negligently performed, all that he can at present do is to dispense with their services so far as his own district is concerned. If the services of these inspectors are dispensed with, whatever the gravity of their offence may be, they are merely reverted to the general list maintained by the Sanitary Commissioner, and, unless that officer sees cause to inflict permanent punishment upon them, they are liable at his discretion to be posted immediately to fresh duty in another district to work under another Collector. Government consider that Sanitary Inspectors employed on plague duty should be placed generally on the same footing, for purposes of discipline, as hospital assistants similarly employed—*vide* G.O., No. 757 P., dated 19th May 1904. They accordingly direct that any order of a Collector punishing a temporary plague subordinate shall have general effect with reference to the re-employment of such subordinate in any other district. For officers of rank lower than that of a Certificated Sanitary Inspector, the Collector's order shall be final, but Certificated Sanitary Inspectors will have a right of appeal to Government through the Collector, and in each such case the opinion of the Sanitary Commissioner will be taken. Permanent servants of Government employed on plague duty will continue subject to the ordinary rules of Government; and resignation of their special plague appointments to avoid dismissal or punishment will not be accepted, but the conduct of the individuals concerned will be reviewed and appropriate orders passed. The lists of Certificated Sanitary Inspectors available for duty will continue to be maintained by the Sanitary Commissioner as heretofore, and inspectors should be deputed for duty by the Sanitary Commissioner on the requisition of, and in consultation with, Collectors.

14. It appears to Government that the present system of employing a temporary staff for plague purposes must be continued subject to fuller powers of control on the part of Collectors. The services of good men of the class of Certificated Sanitary Inspectors, the value of whose work has been to some extent recognised, should be primarily utilised as circle inspectors. These men have received systematic training and may, under proper supervision and control, be expected to render proper service for the pay that they receive. Government also agree that the services of third-class hospital assistants only should be used for circle work, and that the subordinates of the medical department should be employed to the fullest possible extent to which their services can be made available. A large amount of harm is done by improper diagnosis of plague, and a man with medical training of any proper sort is less likely to err than a man who has none. The proposal that hospital assistants should not be entertained for passport work in towns but should be replaced by specially trained clerks cannot, for this reason, be approved; nor can Government accept the proposal that all passport clerks should receive a pay of Rs. 25. A salary of Rs. 15 to Rs. 20 according to local circumstances should ordinarily suffice for this class of officer. Mr. Bedford's proposals to fix the pay of third-class hospital assistants employed as circle inspectors at Rs. 40 *plus* Rs. 15 pony or cycle allowance *plus* Rs. 10 special plague allowance or Rs. 65, in all, is approved.

It is, however, necessary to supplement the staff of Certificated Sanitary Inspectors who will, as hitherto, continue to undergo the course of training prescribed in G.O., No. 1131 L., dated 11th September 1903, and of third-grade hospital assistants who have also undergone a short course in disinfection work. Government approve Mr. Bedford's proposal that the present method of recruitment of Temporary and Assistant Sanitary Inspectors, whose work has evoked wholesale condemnation, should be abolished, and that local men should be trained locally to the extent that they are required and be paid to the extent necessary to obtain their services. These men will have local knowledge and will, in some degree, be subject to local restraints, but very careful initial selection will be necessary. The recruitment and training of these men will be local in each district under the District Medical and Sanitary Officer or his Assistant, who will be held responsible for their proper training on lines approved by Government. This will form a part of the ordinary duties of the District Medical and Sanitary officers who will not be entitled to claim any special remuneration for imparting the requisite instruction. The kind and extent of local training suggested in paragraphs 48—54 of Mr. Bedford's report appear to be generally acceptable. But care should be taken to see that each district possesses a proper equipment for the purpose of such practical instruction as may be prescribed. Full pay will be allowed to members of the permanent establishment undergoing training at these local centres, but in the case of other recruits, the provisions of G.O., No. 1011 P., dated 1st August 1904, will apply, and no allowance will be paid during the period of training until they are pronounced qualified and are actually posted to duty. Government agree as to the desirability of utilising in the place of the present grade of Assistant Sanitary Inspectors, the services of the municipal or union or other local establishment. They also accept Mr. Bedford's views as to how plague inspection should be organised in towns (paragraphs 27 and 39). There should be no difficulty in getting local men for subordinate work. Permanent employés should be of far more use on plague work than new-comers without any local knowledge : these new-comers should replace the permanent hands for ordinary duty.

15. Government agree that the work of disinfection need not be confined to Certificated Sanitary Inspectors alone. All inspectors without distinction will, under the orders of the Collector, be liable to this duty, nor will any special allowances be given for the work. Similarly, Government consider it undesirable to continue the present system of granting allowances calculated at 25 *per cent.* of their pay to inspectors employed in municipal areas on the appearance of plague within their charges (Appendix II–S of Mufassal Plague Regulations). Compulsory training and service should be adopted only as a last resort. The inducement of advancement for good service may, with advantage, be offered and the Revenue subordinate posted to plague duty as circle inspector may be given Rs. 35 or Rs. 40 *plus* Rs. 15 for travelling where carriage is a necessity. If hill allowances are necessary they should also be granted. Where exceptional danger exists or nerve is necessary, higher pay may be sanctioned in exceptional cases to competent men. The suggestions in paragraphs 35 and 42 for giving qualified plague officers berths in the permanent service and counting their plague duty as pensionable service appear to Government to be good in their own way however limited they may be found to be in application. Government would not certainly make it any means of bringing in men not qualified for general service.

16. In paragraphs 59 and 60, Mr. Bedford deals with the superior supervising staff. Efficient supervision is essential; European or Eurasian supervision is very desirable and special plague officers should ordinarily be of this class. When plague breaks out in a new locality, a competent plague officer should at once be deputed. Supervisors should be selected for their administrative capacity, and except in special cases, should not be promoted from the subordinate plague staff. Government concur with Mr. Bedford's remarks except as to nomenclature. The use of the term "Special Deputy Tahsildar" is undesirable and "Supervisor" should be retained.

17. Part X.—Mr Bedford here concludes that the active co-operation of the people in plague measures cannot be relied upon, and that the only means of educating them and arousing their interest is by the distribution of pamphlets. In the opinion of Government pamphlets will do no harm, but the system of granting rewards for information regarding plague cases is not to be encouraged. The people must learn for themselves that information should be supplied by them for their own benefit.

Government consider that it will be quite sufficient if Rules 47, 47-A and 48 of the Mufassal Regulations are more strictly worked than at present. As regards corpse inspection and registration of deaths Mr. Bedford suggests no change in the present system. Government are of opinion that owing to serious objections which arise in consequence of the inspection of women by men, lady-doctors and nurses are a necessity, especially in towns.

18. In paragraph 14 Mr. Bedford suggests that the Special Plague Officer should be made a special Assistant Superintendent of Police for the control of plague police. It may, on occasions, be found desirable that when plague officers have been specially appointed by Government, the plague police should be completely under the control of such officers, and that they should be created special police officers and made subordinate in that regard to the District Superintendent of Police. For such cases special orders will issue in the Judicial department. Government agree that the substitution of the special plague police by the employment of talayaris will be impracticable. The duties on which the plague police should be employed, which are enumerated in paragraph 11, meet with the acceptance of Government. Government also concur with the view that there should be a better supervising staff over the constables and that there should be one head constable for ten men and an European or Eurasian Inspector for one hundred men.

19. In paragraphs 15—24 of Part XI, Mr. Bedford summarises his conclusions on the points specifically referred to him. He is of opinion that while certain improvements in details of organisation and reduction in pay of staff are feasible, the results of plague administration in Madras have more than justified the expenditure incurred. With this conclusion the Government generally agree: it reflects great credit on the ability and industry of the Sanitary Commissioner. Orders will issue separately as to the alterations to be effected in the Plague Regulations with reference to the foregoing remarks.

20. The thanks of Government are due to Mr. Bedford for the careful consideration and the labour which he has bestowed upon his special duty.

(True Extract.)

H. D. TAYLOR,
Ag. Secretary to Government.

To all Collectors (A.—M.).
,, the Sanitary Commissioner.
,, the Surgeon-General.
,, the President of the Corporation of Madras.
,, the Accountant-General.
,, the Financial Department.
,, the Public Department.
,, the Revenue Department.
,, the Judicial Department.
,, Mr. J. P. Bedford, I.C.S.
,, the Government of India and Local Governments and Administrations (with C.L.).
Editors' Table.

Exd. J.M.